MH RFETS 1HSS 113 001

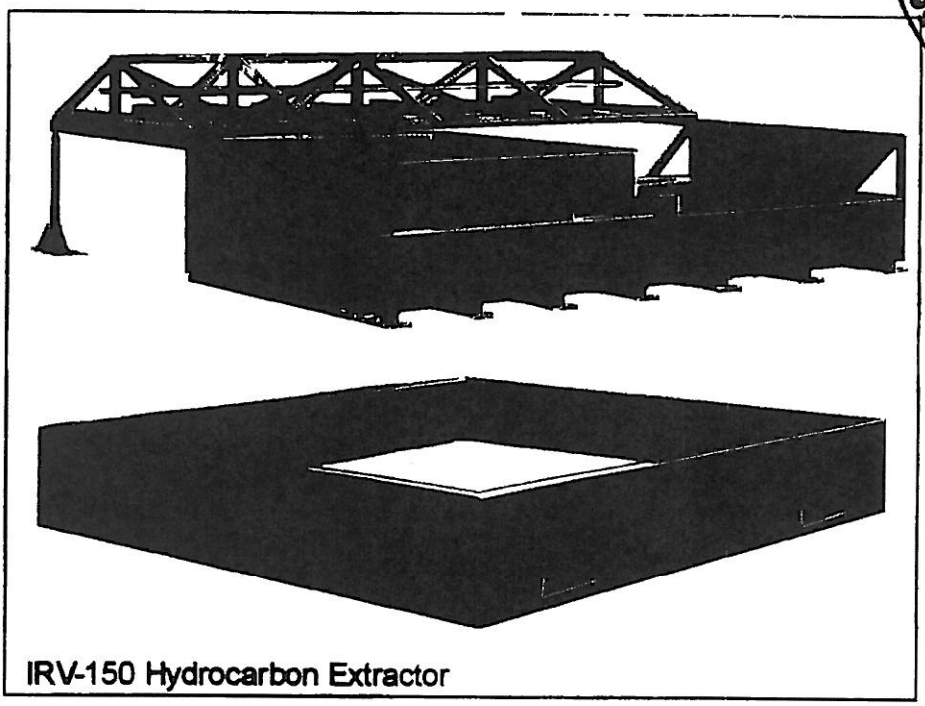
~~RF/RMRS-97-041~~ ACC 7/30

This is a
CONTROLLED DOCUMENT (4)
ROCKY FLATS PLANT
ENVIRONMENTAL MANAGEMENT DEPARTMENT
This is a RED Stamp
COPY # 6

SEP 1997

TERRACHEM
A Service of McLaren/Hart

MOUND SITE SOIL WORKPLAN



IRV-150 Hydrocarbon Extractor

Prepared By:

McLaren Hart, Inc

9323 Stockport Place
Charlotte, North Carolina 28273
(704) 587-0003

Reviewed for Classification/UCNI/OUO
By: Janet Nesheim, Derivative Classifier
DOE, EMCBC
Date: 10-14-08
Confirmed Unclassified, Not UCNI/NOT OUO

ADMIN RECORD

I113-A-00008

ADMINISTRATIVE INFORMATION

Site Rocky Flats Environmental Technology Site (RFETS), Golden, Colorado

Project Name Mound Site Source Removal

Date Prepared July 12, 1997

Approvals

I have read and approved this Mound Site Soil Workplan with respect to project procedures and the planned implementation of the treatment phase of the Mound Site Source Removal Project, IHSS 113

Wayne Sproles
RMRS - Project Manager

7/30/97
Date

Greg DiGregorio
RMRS - Quality Assurance

7/30/97
Date

Peggy Schreckengast
RMRS - ESH&Q

7-30-97
Date

Ron Hill
McClaren/Hart Environmental Engineering Corporation - Project Manager

7/30/97
Date

Table of Contents

List of Tables

List of Figures

1.0 INTRODUCTION

McLaren/Hart Environmental Engineering Corporation (McLaren/Hart) under contract to Rocky Mountain Remediation Services, L L C (RMRS) is providing low temperature thermal desorption (LTTD) services at the United States Department of Energy (U S DOE) Rocky Flats Environmental Technology Site (RFETS) These services are for the LTTD of soil contaminated with various volatile organic compounds (VOCs) at the Mound Site also referred to as IHSS 113

This project is authorized as an accelerated action under the Proposed Action Memorandum (PAM) for the source removal at the Mound Site The field work provided for in this workplan is described more fully in the Field Implementation Plan (FIP) for the Mound Site and the administrative requirements are described in the RFETS Integrated Work Control Package (IWCP)

1.1 Background Information

The Mound site is located north of Central Avenue and just east of the Industrial Area Fence (Figure 1) The site was used to store approximately 1400 drums of depleted uranium and beryllium lathe coolant between April 1954 and September 1958 The lathe coolant was composed of a mixture of hydraulic oil and carbon tetrachloride (70/30) Some of the coolant also contained enriched uranium and plutonium

Additional historical records indicate that some of the drums (approximately 10%) contained tetrachloroethylene (PCE) The drums were covered with soil to produce a mound around and over them The drums were removed from the site in 1970 Some of the drums were thought to have holes in them No alpha emitting radionuclides were detected in the soil at the time of removal The solid material was shipped offsite for disposal and the liquids were processed onsite Airborne radiological contamination was not detected during the removal operation

More recent site characterization indicates that there is slight radiological contamination near the original drum storage surface. VOCs, primarily PCE, have been detected at levels requiring cleanup This contamination extends in places as deep as 15 feet below land surface There are no records which give an estimate on the amount of contamination previously released at the site

1.2 Scope of Work

Approximately 700 cubic yards of soil has been excavated and will be treated at the Mound Site The soil requiring treatment has been excavated and transferred by RFETS personnel to the contaminated soil feed stockpiles (CSFS) located in the treatment area The soil will be treated using low temperature thermal desorption The maximum observed contaminant levels and treatment

performance requirements are given in Table-1

Table-1 Maximum Contaminant Levels and Treatment Requirement

Contaminant	Maximum Observed Contaminant Level (mg/kg)	Treatment Performance Requirement (mg/kg)
PCE	760	2
Carbon tetrachloride	36	2
Methylene chloride	44	2
TCE	8 6	2
1,1,1-TCA	36*	2
1,1-DCE	36*	2
Acetone	730*	80
Toluene	36*	2

* Listed as contaminants in the SOW, but may have been masked by the primary contaminants

Once soils have been treated, sampling and analysis will be conducted in accordance with the Sampling and Analysis Plan to confirm satisfactory treatment of affected soil Soil passing confirmation testing will be transferred back to the Mound Site and backfilled by RFETS personnel

A fully functional and operable LTTD system will be provided for this purpose Detailed electrical and mechanical plans for the system have been provided to RMRS along with a Site Specific Health and Safety Plan (HASP) Properly trained and qualified personnel will be provided to operate the system

The system will be disassembled and decontaminated upon satisfactory completion of the treatment operation The equipment will be surveyed (radiological), and once cleared by RFETS radiological engineering, it will be demobilized from the site

1.3 Source Documents

All field work will be completed in accordance with the SOW and the applicable sections of the following referenced documents These documents will be maintained in the field office trailer for easy access and reference as the need may arise

(1) Statement of Work for Thermal Treatment of Mound Site Soils, Revision 1, April 23, 1997

(2) Field Implementation Plan for the Source Removal at the Mound site IHSS 113, March 1997

(3) Sampling and Analysis Plan to Support the Source Removal at the Mound Site IHSS 113

(4) Air Pollutant Emissions Notice, dated February 12, 1997

(5) Integrated Work Control Package for the Mound Site

(6) Field Operations Procedure FO 1, Revision 3, Air Monitoring and Particulate Control

(7) Proposed Action Memorandum for the Source Removal at the Mound Site IHSS 113

(8) COOP-003, Control of On-Site Training

(9) COOP-006, Operating Area Logs

(10) COOP -007, Shift Relief and Turnover

(11) COOP-010, Control of Operator Aids

(12) COOP-011, Pre-Evolution Briefing

(13) COOP-12, Shift Operating Rounds

(14) COOP-13, Standing, Shift, and Operations Orders

(15) COOP-15, Communications Criteria

(16) COOP-16, Plan of the Day

(17) McLaren/Hart Site Specific Health and Safety Plan for the Thermal Desorption of Soils form the Source Removal at the Mound Site IHSS 113

(18) 40 CFR 265, Subpart P, Thermal Treatment

(19) 40 CFR 60, Appendix A, Method 25A

(20) Rocky Flats Plant Site-Wide Quality Assurance Project Plan

(21) Quality Assurance Program Description, RMRS-QAPD-001

(22) McLaren/Hart IRV-150 LTTDS Operations Manual

2.0 TECHNICAL APPROACH

McLaren/Hart will use its patented and proprietary IRV - 150 low temperature thermal desorption system (LTTDS) for the treatment of VOC contaminated mixed waste soil from the Mound Site at the Rocky Flats Environmental Technology Site Operation of the IRV-150 LTTDS will be in accordance with the requirements of this workplan and the IRV-150 Operations Manual

2.1 Project Overview

Approximately 700 cubic yards of soil affected with VOCs and low levels of radionuclides will be treated using low temperature thermal desorption The primary VOC contaminants, the maximum observed contaminant levels, and the treatment performance requirements are presented in Table-1

The Statement of Work (SOW) requires McLaren/Hart to provide a fully operational and functional LTTD system to complete the soil treatment McLaren/Hart will use four (4) IRV - 150 LTTD units, including all necessary air pollution control equipment and ancillary support equipment for this project The anticipated cumulative production for the four (4) treatment units is approximately 60 cubic yards per day as measured in the units with an average of four hours per day down time

Following mobilization of the equipment to the site and prior to beginning full scale treatment, McLaren/Hart will perform a shakedown on the system using clean representative soil Data from this system analysis will be used to calibrate and adjust the system until operating parameters are achieved

Upon successful completion of the shakedown run, McLaren/Hart will begin full scale treatment operations on contaminated soil The treated soils will be sampled in accordance with the Sampling and Analysis (SAP) and then transferred to the treated soil staging area Confirmation analysis will be completed by RMRS Once satisfactory results are obtained, the treated soil will be transferred to the treated soil stockpile (TSS) area for eventual transfer and backfill at the Mound Site Any soil failing to meet the performance standards will be immediately retreated

2.2 Deliverables

McLaren/Hart will provide RMRS with all the required plans, schedules and submittals prior to mobilization to the site A RCRA Part B Permit is not required, but an Air Pollutant Emission Notice (APEN) is required from the Colorado Department of Public Health and Environment (CDPHE) RMRS will obtain the APEN McLaren/Hart will prepare and submit the following plans and submittals to RMRS for approval prior to mobilization to the site

- Organizational Matrix
- Personnel Qualifications
- Project Schedule
- Training Records
- Equipment Calibration Certificates
- Electrical and Mechanical Plan
- Work Plan (Standard Operating Procedure)
- Site-Specific Health and Safety Plan
- McLaren/Hart Corporate Health and Safety Program

All site specific training performed by RMRS will be completed by McLaren/Hart personnel prior to mobilization

2.3 Mobilization

Following approval of the aforementioned submittals, McLaren/Hart will provide all labor, material, and equipment necessary to mobilize and assemble four (4) IRV - 150 LTTD units equipped with an appropriate air pollution control system as specified in the SOW Table-2 presents the proposed equipment

Table-2 Proposed LTTDS Equipment

Quantity	Item	Quantity	Item
4	IRV - 150 Treatment Chamber	3	Vacuum Blowers
2	Pre-Heaters	4	HEPA Filter Units
1	GAC	1	Electrical System
2	Frac Tanks	1	300 Ton Chiller
2	Condensers/Piping/ Transfer System	24	Treatment Trays
1	FID	1	Instrumentation Control System

McLaren/Hart will be responsible only for minor grading of the treatment area RMRS will be

responsible for bringing the site to a satisfactory level grade for proper placement of the IRV - 150 LTTDS RMRS also will be responsible for demarcation of the exclusion zone, contamination reduction zone, and support zone McLaren/Hart will require a minimum treatment area of approximately 125 feet x 125 feet exclusive of the stockpile and support equipment staging area The LTTDS will require liquid propane gas via a tank supply with sufficient volume (60 gallons/hour) to operate all four (4) IRV - 150 units on a 24 - hour per day basis The supply tanks and propane will be provided by RMRS and located at a termination point within 100 feet of the treatment units McLaren/Hart will provide one (1) vaporizer capable of delivering up to 80 gallons per hour of propane McLaren/Hart will connect the vaporizer to the termination point of the RMRS provided propane supply

McLaren/Hart requires 3-phase electric power within 100 feet of the treatment units The electricity will have a minimum power rating of 480 volts at 1200 amps This includes a single phase power drop of 110 volts at 200 amps RMRS will be responsible for connecting the treatment system to the electrical supply RMRS will provide a main distribution panel based upon the McLaren/Hart Electrical Plan found in Section 4 of this workplan

RMRS will make available an area in an administrative support trailer for controlled access and use by McLaren/Hart project management and administrative support This office area will include an adequate supply of office furniture and two dedicated phone lines for McLaren/Hart RMRS will provide McLaren/Hart with a one-hour fire rated cabinet for records maintenance

RMRS will provide McLaren/Hart with two storage containers (Conex) for its support equipment and supplies A potable water supply with adequate delivery to the site will be provided by RMRS Non-potable water for dust control also will be provided to McLaren/Hart by RMRS

McLaren/Hart workers will be provided access to decontamination facilities provided by RMRS DOE grays and greens will be provided for McLaren/Hart workers by RMRS Two (2) covered break areas will be provided by McLaren/Hart for the McLaren/Hart workers An adequate number of portable toilet facilities also will be provided by RMRS with timely regular service

McLaren/Hart personnel will obtain RFETS badges and electronic gate passes the first day they arrive at RFETS McLaren/Hart will identify vendors who will visit the site on a regular basis and submit the necessary information to RMRS so that they may obtain RFETS badges and electronic gate passes McLaren/Hart will notify the RMRS CTR 24 hours in advance of visitors or vendors needing access approval to RFETS

2.4 Shakedown Run

Following mobilization, McLaren/Hart will conduct a shakedown run Clean soil will be provided by RMRS for this purpose McLaren/Hart estimates that a maximum of 40 cubic yards of soil will be required

The purpose of this run(s) is to demonstrate that the IRV - 150 system is fully operational and functional This run(s) will allow McLaren/Hart to determine the time to the target soil temperature and to make adjustments to the chiller and emission controls system to achieve the target condenser exhaust gas temperature The instrumentation and control system will also be tested over a range of operational conditions to ascertain that it is accurately obtaining data This run(s) will be used to familiarize all personnel with the operation of the system to meet the specific requirements for this project Potential operational problems will be identified and addressed to mitigate any unnecessary delays to full scale treatment Once the shakedown run is satisfactorily completed, McLaren/Hart will establish the treatment baseline This will satisfy the requirements of COOP-003, Control of Shift Training

2.5 Treatment

McLaren/Hart will begin full scale treatment operations following completion of the shakedown run(s) McLaren/Hart will use four (4) IRV - 150 LTTD units and associated emission control systems to treat the soil Each unit contains two (2) trays with each tray containing approximately 2 25 cubic yards of soil The target soil temperature is 180°F with an average total residence time of approximately six (6) hours The soil will be treated for at least 30 minutes beyond the time at which the target soil temperature is reached The treatment system will have no more than four (4) hours of downtime per 24 hour day

The treatment operation will be run on a continuous shift basis (24 hour/day - 5 days/week) At present, McLaren/Hart intends to staff the project with a project manager, two (2) shift supervisors, two (2) lead HSSs, five (5) HSSs, two (2) health and safety technicians, one (1) field clerk, one (1) administrative assistant, three (3) equipment operators, ten (10) ground technicians, and two (2) QA/QC technicians

The first stage of full scale treatment will involve setting baseline conditions Soil containing the highest levels of VOCs have been previously segregated by RMRS during stockpiling operations and made accessible to McLaren/Hart for use in setting the treatment baseline The purpose of the baseline runs is to set the operating parameters so that a 95% probability of attaining the treatment performance requirements can be established in accordance with the SAP In order to establish baseline conditions, process verification samples for VOCs will be collected from each treatment unit for every load of soil treated in accordance with the SAP This will continue until two (2) successive loads from each unit meet the treatment performance requirements and the operating parameters (i e residence time or a terminal soil temperature) are established and relatively constant These parameters will be used throughout the project to treat the soil

As part of this workplan, McLaren/Hart has prepared a Quality Assurance/Quality Control section that follows the applicable guidelines for the SOW and as set forth in the RMRS Environmental

Restoration Projects (ERP) and the Quality Assurance Program Description (QAPD) The QA/QC technician on each shift will comply with the procedures as set forth in the section for the McLaren/Hart QAPjP

McLaren/Hart will be responsible for transferring soil from the contaminated soil feed stockpile area to the IRV - 150 LTTD units Any spillage will be cleaned up immediately, appropriately labeled as necessary, contained and stored The stockpiles will remain covered except as is necessary for loading the treatment units

Soil will be treated following the parameters established during the baseline runs Process verification will be accomplished through sampling and analysis of the treated soil in accordance with the Sampling and Analysis Plan for the Mound Site source removal McLaren/Hart will collect the samples for analysis The samples will be transferred along with the appropriate QA/QC documentation to RMRS RMRS will transfer the samples to the designated laboratory for analysis The cost of the analysis is the responsibility of RMRS

During treatment operations, McLaren/Hart will maintain dust control within the treatment area and stockpile areas Water alone will be used to maintain dust control along travel routes Water mixed with ConCover, a protective soil binder, will be applied to the treated stockpiles to prevent wind borne spread of contamination

The treatment system will be operated in accordance with the applicable or relevant and appropriate requirements (ARARs) set forth in Section 5 of the PAM Documentation for compliance with the ARARs will be maintained by McLaren/Hart following the guidelines specified in 40CFR Part 265 Subpart P

McLaren/Hart will perform continuous stack monitoring of the LTTDS to ensure compliance with the APEN Stack monitoring will be conducted using a flame ionization detector following the procedure specified in 40CFR Part 60 Appendix A

Ambient dust/air monitoring and radiological air monitoring will be performed in accordance with applicable site policies and procedures set forth in the Field Operations Procedure FO 1, Revisions 3, Air Monitoring and Particulate Control Sampling and monitoring equipment for radiological air monitoring will be provided by RMRS This includes all instruments and filter media as well as any calibration standards. RMRS will coordinate and make arrangements for all radiological calibration standards

2.6 Dust Control

A radiological work permit (RWP) is not required for the Mound Site LTTD operations However, maintaining effective dust control to prevent the spread of contamination is absolutely essential Dust

suppression will be conducted in accordance with RMRS Field Operations Procedures, 5-21000 - FO 01

McLaren/Hart will maintain effective dust control by the liberal use of water along travel routes and restricting travel speed Water will be applied using a CAPS 900 application machine Water will be applied whenever dust emission becomes imminent and at a frequency to effectively maintaining dust control Soil handling activity will be stopped if unacceptable visible dust emissions are observed Water will be applied immediately to mitigate the situation

Feed stockpiles will remain covered except as is necessary for loading the IRV - 150 LTTD units The feed stockpiles will be completely covered and secured during periods of no operation (i e weekends, high winds, etc) McLaren/Hart will cease soil handling operations whenever the wind speed exceeds 30 miles per hour (mph) for two (2) consecutive periods of 15 minutes Operations will resume only after two (2) consecutive 15 minute periods have an average wind speed of less than 30 mph

The treated soil will be rehydrated before being transferred to the treated stockpile area McLaren/Hart will allow the soil to cool to a suitable temperature (120°F surface) before rehydration to prevent entrainment of dust particles in steam The soil will be thoroughly wetted by injecting water through a spray tip into the treated soil while it remains in the treatment tray and/or by use of a slow trickling applicator Treated soil will be spray covered with a mixture of ConCover (a soil binder) and water using a special applicator as soon as practical after it is placed in the stockpile area This spray cover will be maintained by McLaren/Hart until the soil is cleared for backfill Maintenance of the spray cover becomes the responsibility of RMRS once backfilling from the stockpile begins and/or after soil treatment operations are completed by McLaren/Hart

The specifications for Con Cover and its MSDS are presented in Attachment-A

2.7 Compliance Monitoring

Compliance monitoring will be conducted in accordance with the requirements set forth in the SOW, Section 7 2 of the FIP, Section 5 of the PAM, and Subpart P of 40CFR 265 and Appendix A, Method 25A, of 40CFR 60 Documentation of compliance will follow the guidelines of applicable sections of the RMRS Environmental Restoration Projects (ERP) Quality Assurance Project Plan (QAPjP)

2.8 Condensate and Stormwater Management

McLaren/Hart estimates that as much as 36,000 gallons of condensate may be generated during the treatment of the Mound Site soil This condensate will be collected in the condensers associated with the emission control system of the IRV - 150 LTTD system The amount of condensate may vary

depending upon the soil moisture content and the actual quantity of soil treated

The condensate will be transferred from the treatment area to a 6,000 gallon intermediate storage tank provided by McLaren/Hart Gravity separation of particulates will be allowed to occur to the greatest extent practical The condensate will be transferred after settling to one of two (2) RMRS provided 10,000 gallon storage tanks The condensate will then be transferred as needed by RMRS from the storage tanks to a tank trailer for transportation to the onsite waste water treatment plant

Stormwater will be collected from the contaminated soil feed stockpiles via the drain system previously installed by RMRS The stormwater will drain to a central collection sump McLaren/Hart will pump the collected stormwater to the intermediate 6,000 gallon storage tank to allow settling of the solids RMRS will be responsible for the management of the stormwater after it is pumped to the RMRS provided 10,000 gallon storage tanks McLaren/Hart will provide no pre-treatment other than the limited gravity separation Stormwater and condensate spills collected in the secondary containment system will be pumped as soon as practicable (within 24 hours) to the 6,000 gallon intermediate storage tank

2.9 Spill Response and Containment

McLaren/Hart will follow the applicable requirements of the spill and containment plan presented in Section 8 0 of the RMRS Field Implementation Plan for the Source Removal at the Mound Site McLaren/Hart also will comply with the applicable requirements set forth in the Emergency Response and Spill Control Procedure (1-NO8-HSP-21 04) and Occurrence Reporting Procedure (ADM 16 01) and the RFETS incidental release actions and occurrence reporting requirements (DOE Order 5000 3)

2.10 Waste Minimization

McLaren/Hart understands the importance of minimizing the quantity of residual waste from the LTTD operations The LTTD has been configured to achieve this objective

McLaren/Hart has increased the surface area of the dry particulate filters (DPF) by a factor of 32 The dry particulate filters have been placed in the bottom of the treatment chamber so that the vast majority of the particulates will be collected in the treatment chamber This configuration allows auto treatment of the DPF Any particulates below the effective filtering size of these filters will enter the condenser which in essence acts as a scrubber to further remove particulates

Pre-heaters will be used to raise the temperature of the offgas from the condenser well above the dewpoint to prevent condensation in the HEPA filter This will help minimize the number of HEPA filters for disposal

Particulates collected at the condenser will be separated in the holding tank and treated through the LTTD system at the end of the project The volume of condensate will be reduced by the use of the tray treatment system Water will not be sprayed into the treatment chamber for cooling and rehydrating the treated soil

Granular activated carbon will be used in the emission control system of the LTTD system to remove non-condensable VOCs Subsequent to completion of the treatment operations, this waste stream will be regenerated at an offsite facility The carbon can then be beneficially reused

McLaren/Hart will ship the chiller coolant to a recycler for beneficial use Preliminary arrangements for this have already been made

The management of all residual waste streams will be completed within the 21 days specified in the Statement of Work (SOW)

2.11 Quality Assurance/Quality Control

All Worked performed under this subcontractor is controlled by the Statement of Work and all applicable sections of the RMRS Environmental Restorations Projects (ERP) Quality Assurance Project Plan (QAPjP) and the Quality Assurance Program Description (QAPD) McLaren/Hart will perform the requirements of the SOW in accordance with the applicable sections of the RMRS QAPD and QAPjP

Specific references to quality affecting procedures, policies, and requirements are more fully described in the following documents

(1) Statement of Work for the Thermal Treatment of Mound Site Soils

(2) Field Implementation Plan for the Source Removal at the Mound Site

(3) Rocky Flats Plant Site-Wide Quality Assurance Project Plan

(4) Subpart P, 40 CFR 265 - Thermal Treatment

(5) Appendix A, 40 CFR 60, Method 25A, Determination of Total Gaseous Organic Concentration Using A Flame Ionization Analyzer

(6) IRV-150 Operations Manual

(7) McLaren/Hart Site Specific Health and Safety Plan

(8) Proposed Action Memorandum for the Source removal at the Mound Site, IHSS 113

(9) Conduct of Operations Manual, 1-31000-COOP, 1993 (Section 03, 06, 07, 10 - 13, 15, 16)

(10) Administrative Procedures Personnel Qualifications, 3-21000-ADM-2 02

(11) Field Operations Manual 5-21000-OPS-FO

(12) Hazardous Waste Requirements 1-1000-WO

(13) RMRS Quality Assurance Program Description RMRS-QAPD-001

(14) RFETS Radiological Operating Instructions Manual, Kaiser-Hill, 1996

(15) RFETS Health and Safety Practices Manual, 1996

(16) RFETS Radiological Control Manual, Kaiser-Hill, 1996

(17) RMRS Heat Stress Monitoring Procedure

(18) Section 1700, Subcontractor Health and Safety Requirements, September 23, 1996

Quality control for the treatment operation is described in the Standard Operating Procedures of this workplan

2.12 Health and Safety

McLaren/Hart has prepared a site specific Health and Safety Plan. This plan has adopted the RMRS site specific Health and Safety Plan (HASP) for the Source Removal at the Mound Site, IHSS 113, with modifications being made by McLaren/Hart for unique tasks associated with the LTTD operation and compliance with the McLaren/Hart Corporate Health and Safety Program All operations will be conducted in strict accordance with the HASP A thorough detailed activity hazard analysis is included in the HASP for each unique activity associated with the LTTD operations McLaren/Hart will follow the RMRS guidance for activity hazard analysis

All personnel assigned to the job will be participants in an RMRS approved medical monitoring program. All McLaren/Hart personnel assigned to the Mound Site project will receive a pre-job drug screen and will be subject to random testing Any random testing required by RMRS will be

coordinated and paid for by RMRS A personal file for each assigned person will be maintained on the site with adequate documentation to support the fulfillment the QA/QC requirements

A copy of the McLaren/Hart Corporate Health and Safety Program Manual will be maintained onsite

2.13 Training

McLaren/Hart will provide personnel who meet the quality assurance requirements of the SOW All personnel will participate in training and indoctrination specific to their job requirements

McLaren/Hart will provide special training for employees on the safe and proper operation of the LTTD system Only personnel who satisfactorily complete both the written and practical training program will be permitted to work on this project The practical training will be included as on-the-job training during shakedown of the LTTDS In addition to the aforementioned training, all personnel will receive on-the-job training during the baseline run(s) to become familiarized with optimum operation of the LTTDS and ancillary equipment

RMRS will provide the following site-specific training to McLaren/Hart employees and subcontractor personnel

- Radiation Worker II, Initial or Requalification
- Radiation Worker Practical Factors
- RFETS Standing Order 24
- Level B PPE Indoctrination
- Buffer Zone Indoctrination
- Radiological Air Monitoring
- Lockout/Tagout Awareness
- Pressure Safety

All affected personnel will have satisfactorily completed the following training as applicable

- OSHA HAZWOPER
- OSHA Annual Refresher
- OSHA Supervisor
- Respirator Indoctrination
- Hazard Communication
- Confined Space Entry
- Hearing Conservation
- Ladder Safety and Fall Protection

McLaren/Hart will document that all personnel meet the minimum training and experience requirements set forth in the SOW No less than twenty-five percent of the assigned personnel will be experienced in the operation of the IRV LTTD system McLaren/Hart will provide documentation on background checks for all subcontractor personnel, including recent work performance

Table-3 presents the required personnel training matrix for the Mound Site LTTDS operations

Table-3 Personnel Training Matrix

Name	Title	RMRS Equivalent	Training
Ronnie D Hill	Project Manager Site Manager	Project Manager Field Supervisor	OSHA 40 hr, 8-hr supervisory, 8-hr refresher, 3-day onsite OJT, Rad Worker II & Practical, Respirator Indoctrination/Fit Test, Level B, Buffer Zone, Radiological
Robert Finley	Shift Supervisor	Field Foreman	

Table-3 Personnel Training Matrix

Greg Braun Randall Scott Al Wehrheim			Air Monitoring, RMRS Quality Assurance, General Construction Safety, Pre-Evolutionary Ops, Pressure Safety, Operation of the IRV-150
To Be Determined (2)	QA Technician	QA/QC Technician	OSHA 40 hr, 8-hr refresher, 3-day onsite OJT, Rad Worker II & Practical, Respirator Indoctrination/Fit Test, Level B, Buffer Zone, Radiological Air Monitoring, RMRS Quality Assurance, Operation of the IRV-150
To Be Determined (3) (10) (2)	Equipment Operator Field Technician H & S Technician	Equipment Operator Laborer Laborer	OSHA 40 hr, 8-hr refresher, 3-day onsite OJT, Rad Worker II & Practical, Respirator Indoctrination/Fit Test, Level B, Buffer Zone, Radiological Air Monitoring, Pre-Evolutionary Ops, Pressure Safety, Operation of the IRV-150, Ladder Safety and Fall Protection as applicable
Steve Aldridge Ronnie Blea Burt Bonfili John Gregg Karen Olsen Chip Sawyer John McGuire	Site Safety Officer Lead HSS HSS	HSS HSS HSS	OSHA 40 hr, 8-hr supervisory, 8-hr refresher, 3-day onsite OJT, Rad Worker II & Practical, Respirator Indoctrination/Fit Test, Level B, Buffer Zone, Radiological Air Monitoring, DOE Radiological Monitoring, RMRS Industrial Hygiene, General Construction Safety, Pre-Evolutionary Ops, Pressure Safety, Operation of the IRV-150

A personnel training matrix will be maintained onsite as part of the QA/QC documentation A personnel file will be developed for each assigned person which will contain copies of all training certificates

2.14 Demobilization

Upon satisfactory completion of treatment of all Mound Site contaminated soil and amenable residues (i e DPF, HEPA, sediment), McLaren/Hart will begin demobilization This will entail disassembly of the LTTD system and individual components to the extent necessary for thorough decontamination of all surfaces potentially exposed to contamination

McLaren/Hart will construct a temporary decontamination pad at the treatment area The decontamination pad will be constructed within one of the contaminated soil feed stockpile areas This area will be certified "clean" by soil analysis performed by RMRS prior to construction of the

decontamination pad The pad will be constructed of a high density polyethylene liner and timbers to form a supporting wall Containment curtains will be installed around the pad to prevent the spread of contamination The pad will be adequately sloped to ensure proper collection of rinsate All rinsate will be transferred to the McLaren/Hart 6,000 gallon storage tank for gravity separation of solids and eventually to the RMRS storage tanks

A hydraulic crane or forklift will be used to lift the equipment and place it on the decontamination pad McLaren/Hart will use a high pressure washer to clean all surfaces Gross decontamination of equipment to remove soil or other objectional material will be completed using hand tools before pressure washing After the equipment has been decontaminated it will be placed in a designated "clean" staging area until it receives radiological clearance for release from the site

The McLaren/Hart HSSs will conduct radiological surveys of the equipment in accordance with the RFETS Radiological Control Manual Once the equipment is cleared and all applicable documentation required in the Radiological Control Manual is completed, submitted and approved by Radiological Engineering, arrangements will be made to ship the equipment offsite

Heavy equipment used in the operation will be decontaminated and cleared for release from the site in the same way The only exception is that it will be driven onto the decontamination pad for thorough cleaning The condensate storage tank will be transported to the RFETS onsite decontamination facility for decontamination Prior to transport, all residue to the extent practical will be removed and containerized according to the applicable requirements of the RFETS procedures and policies

2.15 Project Schedule

The project schedule is presented in Figure-2 The projected time lines are contingent upon the start date A revised project schedule will be submitted weekly to the CTR

2.16 Project Closeout

Once demobilization is completed, McLaren/Hart will transfer all original project records to RMRS in accordance with the RMRS QAPjP This includes all applicable original documentation for the following

(1) Workplans
(2) Process Quality Control Records
(3) Health and Safety Records

(4) Project Managers Logbooks
(5) Shift Supervisors Logbooks
(6) Site Safety Officer Logbooks
(7) Health and Safety Specialist Logbooks
(8) Incident/Investigation Reports
(9) As-Built Drawings
(10) Chain-of-Custody Logs
(11) Data Summary Reports
(12) Data Validation
(13) Field and Laboratory Calibration Records
(14) Completed Standard Operating Procedure Forms
(15) Training and Qualification Records
(16) Permit Compliance Report
(17) HASP
(18) Drawings
(19) Maps
(20) Photographs
(21) Electronic Media
(22) Quality Assurance Addenda

3.0 PROJECT PERSONNEL RESPONSIBILITIES

The responsibilities and authorities of assigned personnel are presented below The project organization is shown in Figure-3 A project phone list is presented in Table-4

Figure-3
McLaren/Hart Project Organization

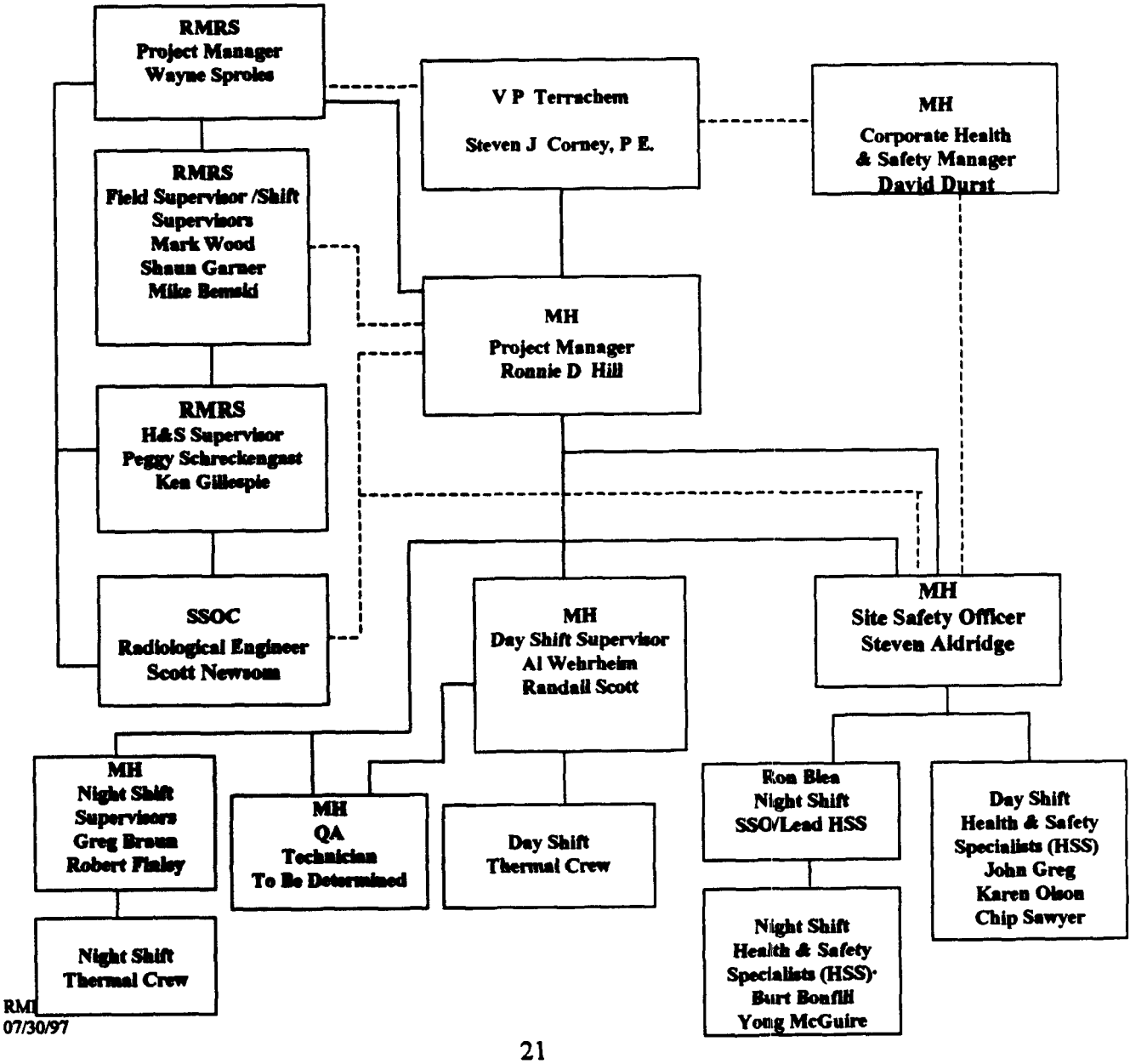


Table 4: Project Phone List

Name	Company/Title	Phone	Pager	Radio	Home
Aldridge, Steve	MH – Site Safety Officer/Lead IHS	4183	308-2137	3719	[redacted]
Anderson, Jerry	RMRS – Rad Operations	6438	7447	3718	
Barnes, Dave	RFCO – Health and Safety Specialist	3352	3542	3748	
Blea, Ron	MH – Night Shift SSO/Lead IHS	4183	560-1530	3726	
[illegible], Cherry	RMRS – Site Access Coordinator	3542	6126		
[illegible], Mike	RMRS – Night Shift Supervisor	4098	7466	3805	
[illegible], Dan	MH – Health & Safety Specialist	4310	826-1040		
[illegible]	MH – Shift Supervisor	5338			
[illegible]	RMRS – ER Projects Manager	6007	4010	3740	
[illegible]	RMRS – Field Operations [illegible]	3302	1227	3802	
[illegible]	RMRS – H&S Team Leader	6673	3806	1659	
[illegible]	RMRS – [illegible]	5876	5473	3763	
[illegible]	[illegible]				
[illegible]	RMRS – Maintenance	8177	7223	3411	
[illegible]	RMRS – Project Support	4605	3842	3810	
[illegible]	RMRS – Quality Assurance	5688	1732	-	
[illegible]	MH – Shift Supervisor	5338			
[illegible]	RMRS – Day Shift Supervisor	6588	4620		
[illegible]	MH – Corporate H&S Manager				
[illegible]	RMRS – Health & Safety Supervisor	5356	4007	3733	
[illegible]	MH – Health & Safety Specialist	4310			
[illegible]	[illegible]	6636	7334	3296	
[illegible]	MH – Project Manager/Superintendent	5338	888-979-2132	3796	
[illegible]	[illegible]	2397	3366	3271	
[illegible]	RMRS – H&S Team Leader	3374	7433	4585	
[illegible]	RMRS – Project Support	5703	7471	3776	
[illegible]	MH – Health & Safety Specialist	4310			
[illegible]	[illegible]	8148	3977	3242	
[illegible]	MH – Health & Safety Specialist	4370	1170	3795	
[illegible]	[illegible]	3073	7464	3808	
[illegible]	[illegible]	6627	5120	3779	
[illegible]	[illegible]	4310			
[illegible]	[illegible]	6790	3031	3702	
[illegible]	[illegible]	5338			
[illegible]	[illegible]	9886	4462	3769	
[illegible]	[illegible]	6613	7205		
[illegible]	[illegible]	5790	1245	3793	
[illegible]	[illegible]	4320	-	-	
[illegible]	[illegible]	4929	1011	-	
[illegible]	[illegible]	5338			
[illegible]	[illegible]	6669	3904	3796	

RMRSWORK2.doc
07/30/97

3.1 All Personnel

Each person is responsible for the health and safety of themselves and their coworkers, for completing tasks in a safe manner and in accordance with the workplan and SOW, and reporting any unsafe acts or unanticipated hazards or conditions to the Shift Supervisor, Project Manager, Project Superintendent, Site Safety Officer, or the Health and Safety Specialist All personnel are responsible for continuous adherence to the HASP and workplan during the performance of their work No person may work in a manner that conflicts with the letter of or the intent of, safety and environmental precautions expressed in the HASP and this workplan McLaren/Hart□s employees and subcontractors are subject to progressive discipline and may be terminated for blatant or continued violations

3.2 Vice-President of Operations

The Vice-President of Operations is responsible for all low temperature thermal desorption projects performed by McLaren/Hart He has authority to commit whatever resources are necessary for completion of a project

3.3 McLaren/Hart Project Manager

The McLaren/Hart Project Manager (PM) is ultimately responsible for the overall implementation and administration of the contract and ensuring that all project activities are completed in accordance with the requirements set forth in the Statement of Work (SOW) The McLaren/Hart PM is responsible for ensuring all accidents, operational problems, and incidents on the project are reported, thoroughly investigated, and corrected The MH PM must approve in writing any addenda or modifications of the HASP and/or workplan. The MH PM will be responsible for overall implementation of the HASP and workplan. This will include communicating site requirements and objectives to all on-site project personnel (MH, RFETS, and subcontractor personnel) and consultation as needed with the SSO, the HSSs, and the RMRS PM. As required by MH policy and procedure, the MH PM will be responsible for informing the SSO, the HSS and the Shift Supervisors of any changes in the work plan, so that those changes may be properly addressed Other responsibilities include

- Ensuring that the requirements in the SOW are met,
- Preparation of the Plan of the Day (POD),
- Monitoring and ensuring that QA/QC is adhered to during all operations in accordance with applicable documents,
- Authority over all technical and contractual issues,

- Managing the development and implementation of the site specific HASP and Activity Hazard Analyses,
- Performing daily onsite inspections to make certain that the workplan is being followed and taking appropriate corrective action as necessary to correct any deficiencies,
- Performing and documenting formal weekly onsite inspections to identify and correct new or previously missed hazards, safety violations, and failure in hazard controls,
- Stopping work, if necessary, to ensure personal safety and protection of property, or where life or property-threatening noncompliance with safety requirements is found,
- Completing and submitting incident/corrective action reports,
- Coordinating with the SSO and HSSs on health and safety matters,
- Ensuring that resources are made available for all project related work and health and safety requirements,
- Providing the appropriate monitoring and safety equipment necessary for implementing this HASP,
- Suspending field activities for radiological safety issues and consulting with Radiological Safety,
- Coordinating and communicating with the Shift Supervisors on operational plans, goals, and objectives to satisfy the requirements of the SOW
- Suspending individuals from field activities for infractions of the HASP pending an evaluation by the SSO and/or the HSSs,
- Ensuring that proper controls and work practices are in place following any unanticipated hazard or condition including necessary changes to the HASP, Activity Hazard Analyses, and workplan,
- Escorting employees with injuries or illnesses to RFETS Medical,
- Determining and posting routes to capable medical facilities and emergency telephone numbers (including poison control facilities) and arranging emergency transportation to medical facilities,
- Ensuring that all site personnel have obtained the proper medical clearance, all site
- personnel have met the appropriate and applicable training requirements and the appropriate training documentation is onsite, and monitoring all team members to ensure compliance with the HASP,
- Implementing emergency procedures as required,
- Assisting in accident investigations and implementing corrective actions to any unsafe conditions or hazards,
- Implementation of a corrective action to all contractual non-conformance notices,
- Diagnosing the need for and implementing corrective action to the LTTD system to maintain performance, and
- Monitoring and/or ensuring records documentation for all activities meet the stated requirements.

3.4 RMRS Project Manager

The RMRS Project Manager is the Contractor Technical Representative who is responsible for overall operations during fieldwork on the site including the health safety of project personnel during site activities and compliance with applicable RFETS policies and procedures, and DOE Orders The RMRS Project Manger is responsible for total overall implementation of the RMRS and MH HASPs, FIP, SAP, IWCP, PAM, and COOPs and protecting surrounding facilities and any potentially affected communities Other responsibilities of the RMRS PM include

- Performing periodic on site inspections to make certain that the SOW, workplan, RFETS policies and procedures, DOE orders, FIP, SAP, IWCP, PAM, COOPs, and HASP are being followed,
- Coordinating with the MH PM and RMRS Health and Safety Supervisor on the health and safety matters,
- Coordinating and ensuring that the RMRS provided resources are available for all health and safety requirements and other operational requirements,
- Suspending field activities if health and safety of personnel are endangered pending an evaluation by the MH PM or the RMRS Health and Safety Supervisor,
- Suspending field activities for radiological safety issues and consulting with RMRS Radiological Safety,
- Ensuring that proper controls and work practices are in place during all operations following any unanticipated hazard or condition including necessary changes to the HASP or Activity Hazard Analyses, or workplan,
- Implementing emergency procedures as required,
- Assisting in accident investigations and implementing corrective actions to any unsafe conditions

3.5 McLaren/Hart Corporate Health and Safety Manager

The MH Corporate Health and Safety Manager (CHSM) oversees the development and implementation of the McLaren/Hart Corporate Health and Safety Programs for MH field project The CHSM will conduct audits of the project for compliance with the MH Corporate Health and Safety Programs

3.6 SSOC Radiological Engineer

The radiological engineer will be responsible for implementation of all radiological control This includes communicating site radiological conditions to all on site project personnel and consultation

with the MH and RMRS SS, MH PM and the RMRS PM The specific duties of the Radiological Engineer include the following

- Implementing the requirements set forth in the radiological control guidelines,
- Preparing Property/Waste Release Evaluations (P/WREs) for release of equipment from the work area,
- Preparing the Radiological Work Permits (RWP) if required,
- Coordinating and documenting activities with the SSO and HSSs to limit radiation exposures to levels that are As Low As Reasonably Achievable (ALARA),
- Suspending work in accordance with the Radiological Work Permit (RWP), if one is required, or other radiological control guidelines in place, if health or safety of personnel or the environment is endangered

3.7 Site Safety Officer (SSO)

The SSO is responsible for on site compliance with and implementation of the HASP The SSO and ultimately the Project Manager are responsible for the safe conduct of operations The SSO will supervise the Health and Safety Specialists (HSS) to ensure that the project and its personnel comply with all health and safety and radiological requirements of the HASP and Radiological Work Permits (RWP), if required The specific health and safety duties of the SSO include the following

- Ensuring that all PPE and monitoring equipment is operational and functionable,
- Developing the site specific Activity Hazard Analyses and the HASP,
- Reporting to the MH Health and Safety Manager and the MH PM on all health and safety matters,
- Interfacing with RMRS and RFETS health and safety, Radiological Operations and Radiological Engineering personnel
- Providing a copy of the HASP to all field crews and ensuring they have read and understand it,
- Ensuring that current medical clearance and training documentation are available and verifying each team member is suitable for work based on the employees training and physicians recommendations,
- Advising medical personnel of the potential exposures and consequences,
- Notifying employees in writing of integrated air monitoring results within 5 days of receipt of laboratory results,
- Obtaining required health and safety equipment and maintaining equipment on the site,
- Conducting daily pre-work health and safety briefings,
- Conducting daily site health and safety inspections, document and correct all deficiencies,
- Supervising the HSSs in ensuring project compliance with the HASP and in

performing all required radiological control activities in compliance with the RWP, Radiological Engineering and all RFETS Radiological Procedures
- Immediately reporting and investigating safety-related incidents or accidents to the MH Health and Safety Manager and the MH PM,
- Overseeing or conducting required health and safety monitoring such as air contaminant, noise, and heat or cold stress monitoring,
- Performing periodic inspections of the protective clothing and equipment to ensure that it is properly stored and maintained,
- Maintaining a health and safety log including monitoring results and observations,
- Suspending work or otherwise limiting personnel exposures if the HASP appears to be deficient, or if the health or safety of personnel is endangered,
- Implementing emergency procedures as required, and
- Completing incident/accident reports on health and safety related occurrences

3.8 Health Safety Specialist (HSS)

The HASP for the Mound Site Soil LTTD project is implemented by the HSSs The HSSs are responsible also for assisting the SSO and Radiological Engineering in ensuring project compliance with the RWP, if required The specific health and safety and radiological duties of the HSSs include the following

- Assisting the SSO in implementing the HASP,
- Reporting to the SSO and the SS on all health and safety and radiological matters,
- Monitoring and ensuring that all site entry records are complete and accurate for each shift,
- Supervision of all maintenance activities associated with heavy equipment and the LTTD system,
- Assisting the SSO in conducting daily pre-work health and safety briefings,
- Coordinating and documenting activities to limit radiation exposures to levels that are As Low As Reasonably Achievable (ALARA),
- Immediately reporting all safety-related incidents or accidents to the SSO and the SS,
- Performing radiological surveys of soils, equipment, and personnel, as required,
- Performing radiological air monitoring, as required, following the established protocol,
- Performing source checks and calibrations of the radiological and health and safety monitoring instrumentation on each shift, as required,
- Conducting all required air contaminant, noise, and heat or cold stress monitoring,
- Maintaining a health and safety and radiological control log including monitoring results and observations,

- Documenting and submitting copies of all formalized radiological surveys and air monitoring data to the MH PM or SS,
- Directing personnel to change work practices if existing practices are deemed to be hazardous to the health and safety of personnel,
- Suspending work in accordance with the Radiological Work Permit (RWP), as required if health or safety of personnel or the environment is endangered, and
- Implementing emergency procedures as required

3.9 RMRS Health and Safety Supervisor

The RMRS Health and Safety Supervisor is responsible for total overall compliance with and implementation of the HASP The RMRS Health and Safety Supervisors responsibilities include the following

- Develop all health and safety requirements for the project,
- Approve the site specific Activity Hazard Analyses and the HASP,
- Approve all changes to the site specific Activity Hazard Analyses and the HASP,
- Provide assistance to the SSO and HSS on all health and safety issues,
- Conduct periodic health and safety inspections of the project and provide a written report on the results to the MH PM and SSO,
- Ensure prompt reporting of all accidents and incidents, and
- Maintain all required health and safety statistical information pertinent to employee hours worked

3.10 RMRS Field Supervisor/Shift Supervisor

The RMRS Field Supervisor, in coordination with the MH PM and the SSO, will be responsible for the implementation of the HASP and workplan This will include communicating site requirements to all on site project personnel The RMRS Field Supervisors specific duties include the following

- Working with the MH Project Manager in the enforcement of the requirements of the SOW, HASP, FIP, SAP, IWCP, PAM, and COOPs,
- Suspending work, as required, to ensure personal safety and protection of property, or where life or property-threatening non-compliance with safety requirements is found,
- Ensuring site permits are obtained before work begins at each site,
- Notifying the RMRS Project Manager of any accidents, spills, or emergencies,
- Informing facility personnel of activities that will be carried out on a particular day,

3.12 Subcontractors

Subcontractors are required to implement and adhere to the HASP and the workplan The following specific responsibilities are included

- Attending site specific orientation and follow the requirements set forth in this plan,
- Providing the SSO with copies of Material Safety Data Sheets (MSDS) for all hazardous chemicals brought on the site, and
- Providing copies of all required training and medical authorizations to the SSO

3.13 QA/QC Technicians

The QA/QC technicians are responsible for monitoring the operation of the LTTD system and documenting all results in accordance with the RMRS QAPjP Specific responsibilities include the following

- Monitoring and logging all LTTD operational performance data,
- Reviewing and verifying all data is accurate and complete,
- Notifying the SS and PM of any operational non-compliance with established monitoring parameters,
- Supervising the collection of performance verification samples, completion of chain-of custody records, and all other requirements in the SAP,
- Communicating operational problems or anomalies with the relief QA/QC tech and SS,
- Maintaining a logbook of all QA/QC operations,
- Ensuring that all QA/QC documentation satisfies the requirements of the RMRS QAPjP,
- Coordinating delivery/transfer of verification samples,
- Compliance with the POD, SAP HASP and the workplan, and
- Ensuring that the FID is operated in compliance with EPA Method 25A

3.14 Equipment Operators

The equipment operators will be responsible for loading and unloading the trays to the LTTD system, transferring soil in the treated stockpile area, and maintaining dust control Specific responsibilities include the following.

- Adherence to the HASP, POD, and workplan,
- Compliance with the RFETS dust control procedures and application of the soil binder

- Ensuring that all site personnel have met appropriate training requirements and have the appropriate training documentation at the site,
- Implementing corrective actions to any unsafe conditions and operations deficiencies, and Implementing emergency procedures as required

3.11 McLaren/Hart Shift Supervisors

The MH SS, in coordination with the MH PM will be responsible for implementation of the workplan and SOW The PM, SS, and SSO will be responsible for the implementation of the workplan This will include communicating site requirements, assignments and objectives to all onsite project personnel The SS is responsible for directing shift operations and safety The SS□s duties and responsibilities include the following

- Maintaining a complete, thorough, and detailed logbook of shift operations,
- Supervising execution of the daily work plan on the shift,
- Maintaining control of treated soil stockpiles,
- Enforcing compliance with safety procedures as given in the HASP and in the daily work activity and tailgate safety briefings,
- Directing personnel in maintaining effective dust control,
- Coordinating with the SSO in instructing and enforcing compliance with the PPE requirements and the QA/QC tech for compliance with the project quality control,
- Enforcing site control and work procedures,
- Documenting field activities in conformance to the RMRS QAPjP and COOPs,
- Communication of all outstanding tasks, issues, and developments during the shift to the oncoming relief SS,
- Performing periodic site safety walk downs and QA/QC checks of operations,
- Performing the shift work activities section of the daily shift tailgate safety briefing at the beginning of the shift,
- Maintaining a shift materials and equipment inventory and coordinating procurement of needed materials and supplies with the PM,
- Preparing a daily shift operations report including submittal of all shift related operations documentation,
- Notifying the MH PM and SSO of potentially unsafe working conditions and of any operational problems or deficiencies and any and all corrective action taken,
- Reviewing all shift QA/QC records for accuracy, completeness, and conformance to the reporting requirements, and
- Assist in preparing incident/accident reports

to the treated soils and water to roadways as necessary,
- Safe, uniform loading of soil into the treatment trays,
- Safe operation of assigned heavy equipment,
- Daily shift inspection, maintenance, and documentation of equipment condition and readiness and reporting any unsafe conditions,
- Compliance with the soil staging and stockpiling plan,
- Maintaining awareness of and communication with ground personnel, and
- Cleaning up any soil spillage as soon as possible

3.15 Ground Technicians

The ground technicians are responsible for providing ground support to the LTTD operations Specific responsibilities include the following

- Adherence to the POD, HASP, and workplan,
- Compliance with the RFETS dust control policy,
- Assisting the heavy equipment operator in loading trays by leveling the soil and filling any voids,
- Maintenance of the LTTD dry particulate filters (DPF), treatment tray screens, HEPA filters, and daily greasing of the blower bearings,
- Assisting the heavy equipment operator in unloading the treatment trays and rehydration of treated soil,
- Collecting soil samples as directed by the SS and in coordination with the QA/QC tech,
- Maintaining a clean, organized, and safe work area, and
- Notifying the SS, SSO, and/or HSS of any observed or suspected safety concerns and/or operational problems

3.16 Health and Safety Technician

The health and safety technician is responsible for providing health and safety support for the field operations Specific responsibilities include the following

- Ensure that an adequate supply of PPE is at the dress out area for the shift operations,
- Notify the SS and SSO of any defective materials and/or equipment and properly tag it out of service,
- Maintain an inventory of all PPE and provide timely notification to the SS and SSO so that materials may be procured,
- Provide support to field personnel through operation of the air trailer,
- Properly operate the air trailer to get optimum utilization of the air supply,
- Assist the HSSs in scanning out field personnel exiting the EZ,

- Maintain adequate supply of water and electrolyte drinks for the field personnel,
- Assist the HSSs in monitoring for heat stress, and
- Reporting any unsafe conditions or operations immediately to the SS and SSO

4.0 PERSONNEL QUALIFICATIONS

All McLaren/Hart personnel and subcontractor personnel will have received all of the applicable training as set forth in Section 2 13 of this workplan In addition to these training requirements, additional qualifications are required and will be documented in the qualifications matrix Supporting documentation will be included in the individual's project personnel file which will be maintained in the field office trailer Table-5, Personnel Minimum Qualifications, presents the minimum qualifications an individual must meet before assignment to the LTTD operations Twenty-five percent of the assigned personnel will have at least one month of experience in operating an LTTDS

Table 5
Personnel Minimum Qualifications

Position	Minimum Qualifications
Project Manager	3 years experience working with hazardous and/or radiological sites 2 years experience in operations of thermal desorption field projects
Field Supervisor	2 years experience working with hazardous and/or radiological sites Previous supervision of at least one successful full-scale thermal desorption project using the proposed system
HSS Leads	5 years experience as a health and safety professional and at least one of the following certifications CIH, CSP, ASP, OHST, QSO-CSM, WSO-CSSD, WSO-CSE, WSO-CST, IHIT with documented experience int he construction safety discipline, or demonstrable knowledge of OSHA Title 29 CFR 1926 "Safety and Health Regulations for General Construction," and 29 CFR 1910 "Occupational Safety and Health Standards for General Industry," American National Standards Institute (ANSI) standards, NES, and NFPA standards
HSS (non-lead)	2 years radiological protection/monitoring experience plus 1 year occupational health and safety protection/monitoring experience Must take and pass the DOE Radiological Control Technician core academics exam, the RMRS Industrial Hygiene exam, and an oral

Table 5
Personnel Minimum Qualifications

	board exam
Equipment Operator	Satisfactory demonstration of ability to operate heavy equipment 6 months experience working with hazardous and/or radiological sites or technical school diploma, degree, or equivalent
Ground Technician	1 year experience in a related or similar field or technical school diploma degree or equivalent
QA/QC Technician	Comprehensive knowledge of computers and Excel software program Related technical degree Training in QA/QC or related experience
HST	1 year experience in a related or similar field, a technical school diploma, degree or equivalent

5.0 ELECTRICAL AND MECHANICAL PLAN

The remainder of this section presents a general description of the proposed IRV-150 Low Temperature Thermal Desorption System (LTTDS) This system is designed around the patented McLaren/Hart infrared technology Attachment-B is a Process and Instrumentation Diagram for the proposed LTTDS

5.1 IRV-150 LTTDS Description and Specifications

The IRV-150 Low Temperature Thermal Desorption System (LTTDS) is a portable modular unit(s) used to remove volatile and semi-volatile contaminants from soil The design will accommodate petroleum hydrocarbons, chlorinated, aromatic, and aliphatic solvents, as well as semi-volatiles in the soil and aggregates

The principle used in this method of soil treatment includes infrared heat, convection heat, vacuum extraction, and reduced pressure volatilization in a batch treatment system Infrared heaters mounted above the contaminated soil is the primary heat source Infrared light, with some convection heat from the propane-fired infrared source, heats the top four (4) inches of the soil without heating the

air as a transfer medium Upon striking the soil, the infrared energy is converted to heat The effected top layer of soil becomes a large emitter The air flow from the vacuum is directed downward, and the emitted heat from the top layer of soil is used to heat the remaining eight (8) inches of soil through conduction and convection The temperature differential between the upper and lower portions of the soil is the driving force and determines the rate of radiant energy transfer

Once desorption occurs, the introduced air transports these contaminants from the treatment chamber to a condenser designed to remove the desorbed condensable contaminants from the exhaust gas stream The carrier gas is discharged to a granular activated carbon system for polishing to remove non-condensable and adsorbable contaminants prior to discharge to the atmosphere

The overall effect is a batch treatment system capable of desorbing target contaminants from a non-liquid matrix under a non-oxidative atmosphere and low temperature such that the desorbed contaminants do not degrade and generate thermal or oxidative by-products Essentially, the desorbed contaminants undergo a reversible phase change from liquid to vapor in the treatment chamber and are condensed back to liquid in the condenser

5.1.1 Treatment Chamber

Each of four (4) low temperature thermal desorption units consists of an 8 foot x 16 foot steel container with a vacuum extraction chamber, which holds two (2) trays each that are 7 foot x 7 foot with a 0 010 slotted flat screen in the bottom Attached to the underside of the steel top and located approximately 8 inches above the soil are infrared heaters The steel top of the container rolls on and off, and the front of the chamber is open in order to load and unload trays A loader pre-loads up to 2 25 cubic yards of soil into the tray for a combined total of 4 5 cubic yards per unit
The burner system consists of 16 infrared heaters per LTTDU Each unit is connected to a gas manifold which has a flow control valve for each heater The propane fired infrared heaters are equipped with a regulator which meters the propane at 4-6 psi into the unit's manifold At the propane source there is a high pressure regulator and an excess flow control valve which will stop the flow of gas to the system in the event of a fire or low pressure conditions The remote gas shut off valve can be easily accessed for shut down of the entire system should the need arise

A thermocouple is located in the treatment chamber vacuum manifold to monitor the desorption process and ensure that treatment conditions conform to design parameters necessary for effective and proper desorption and collection of the target contaminants The temperature is read and recorded at fifteen minute intervals A temperature probe will be inserted into the soil to verify that the soil temperature corresponds with the manifold temperature or if further treatment is required

The following delineates the LTTDS specifications

Heater Temperature	1,200°F
Soil Temperatures Range	180 - 600°F
Operational Heat	1 28 million BTU/hr/unit
Soil Capacity	4 5 cubic yards/unit
Work Space Needed For System	16,000 Square Feet
Fuel Requirements	1,500 gallons LP gas/day
Air Turnover	1,500 CFM/unit
Soil Target Temperature	180°F
Residence Time	30 minutes at 180°F
System Soil Production	3 cubic yards/hr
System Soil Production	60 cubic yards/day

5.1.2 Dry Particulate Filter

The most widely used type of dust-collection equipment is the fixed substrate cyclone, in which dust-laden gas enters an expanded chamber and flows through a filter fabric This primary dry particulate filter (DPF) removes particulates larger than 5 0 microns and protects the subsequent and more refined filtration of the HEPA filtration system The dry particulate filter is the bottom component of the treatment chamber The specifications for the filter fabric are given in Attachment-C

5.1.3 Condenser and Chiller

Following the dry particulate filtration, the air enters the condenser The condenser is made of fin and tube construction with an actual capacity of 8,000 cfm and capability of removing 2,000 pounds per hour of water or SVOC and VOC emissions The system has an estimated rated efficiency of up to 80 % removal of SVOCs and up to 60% removal of total VOCs at their individual saturated vapor pressure It is installed in line to condense and remove the desorbed contaminants from the carrier gas stream It is installed after the two dry particulate filters to further prevent potentially radioactive dust from escaping the system

The single stage condenser is designed to receive an air stream at a flow rate of approximately 6,000 scfm and a maximum temperature of approximately 400°F The condenser coils are coated with a phenolic resin, Heresite, to provide chemical resistance to the offgas The specifications for the coating are presented in Attachment-D The generated condensate is transferred by an air diaphragm pump into a collection tank situated at the edge of the exclusion zone

In order to operate the condensers at these parameters, the condensers are coupled to a chiller which uses propylene glycol and water as the cooling media The total cooling capacity of the chiller is approximately 300 tons or 3,600,000 BTU/hr (STP) This cooling media is non-contact relative to the carrier gas passing through the condenser and has no potential for cross contamination The entering gas stream is cooled to less than 50°F before exiting the condenser Temperatures of the outlet coolant and inlet and outlet air temperatures will be monitored and recorded every 15 minutes

The condensate products are transferred from the collection tank in the condenser to a temporary storage tank using an air diaphragm pump

5.1.4 HEPA Pre-Heater

A 72kw pre-heater is placed in line after the condenser to raise the temperature of the air entering the HEPA to above 80°F The pre-heater is installed to increase the air temperature above the dew point and thereby prevent condensation within the HEPA filter housing and ultimately failure of the HEPA filter The pre-heater requires a 480 V, 3-phase electrical supply and pulls 86 6 full load amps.

5.1.5 HEPA Filter

Following dry particulate filtration, the offgas is further filtered with a dual 0 3 micron high efficiency particulate air (HEPA) filter which is 99 97% efficient A stationary HEPA filter unit will be used for this purpose This HEPA filter will prevent particulates from leaving the stack and will pass a "D O P " test to demonstrate the 0 3 micron particle removal efficiency Attachment-E presents the HEPA filter specifications

5.1.6 Vacuum/Blower

The LTTDS utilizes a vacuum extraction system in combination with heat to produce a very effective and rapid means of contaminant desorption The vacuum portion of the system has two functions First, it acts as a conventional vacuum extraction unit, with heat added to enhance the effects. Second, it serves as a pressure reduction system The vacuum chamber and the soil compartment is placed under low pressure A pressure gradient is created The vacuum ranges from zero to fifty inches of water column depending on soil physical characteristics This reduction in pressure reduces the boiling points of the contamination constituents that are to be extracted This allows the LTTDS to remove heavy (high boiling point compounds) contaminants at lower temperatures

The vacuum system of each tray is comprised of stainless steel 0 010 slot flat screen which

is 7 feet x 7 feet These screens, located at the bottom of the tray, open into a chamber which is connected to a manifold with a 12 inch outlet The manifold of the LTTDU is connected to a vacuum blower which moves up to 5,000 CFM of air at up to 50 inches of water column The blower is driven by a 75 HP electric motor which is powered by a 480 volt, 3-phase electric motor which has a 90 FLA The blower draws air through the entire system

5.1.7 Electrical Power

Electrical power is provided through a main panel provided by RMRS A total of 1,200 amps 480 VAC circuit is recommended The specific requirements are presented in the Electrical Plan (Attachment-F) and summarized in Section 5 4

5.1.8 Instrumentation and Controls

McLaren/Hart has developed an instrumentation and control system to provide quality control in the operation of the LTTDS The design of the instrumentation and control system is based largely upon our past experience working at the RFETS The instrumentation and control system is designed to meet the quality assurance requirements for process control which is specified in the Standard Operating Procedures for the LTTDS operation

During the operation of the LTTDS, all of the process parameters will be monitored remotely through the use of process monitoring controllers and various other parameter specific monitoring components

The air temperature, vacuum, differential pressure, soil temperature, air flow velocity, total hydrocarbon concentration and humidity will be monitored at specific points throughout the LTTDS Each monitoring point and parameter is identified and located on the Process and Instrumentation diagram (Attachment-B) All data will be collected and digitized by the microprocessor of the monitor controller and transmitted to a main control computer AnaWin software will be used to convert the digital signal from the transmitter and record the data for the specific parameter The system will be set up with ten critical alarm outputs that will prompt workers as to specific parameter events The alarm output will activate an alarm light on a display located at a point that will be observable from both the exclusion zone and the support zone Alarm parameters such as dry particulate filter differential pressure, HEPA differential pressure, opacity, total hydrocarbon excess emissions, and target soil temperature will be included in these alarm functions

5.1.9 Granular Activated Carbon

A modular granular activated carbon filtration system (GAC) is installed after the HEPA

filtration system and before the stack The GAC system is filled with approximately 10,000 pounds of 4x6 sieve size coconut shell activated carbon The GAC will remove up to 95% of the VOCs and polishes off the exhaust gas stream before being discharged out of the stack The specifications for the granular activated carbon are given in Attachment-G

5.1.10 Stack

The exhaust gases are vented to the atmosphere through a 19 inch i d stack which is approximately 16 feet in height The exhaust gases are monitored for total VOCs, opacity, humidity, temperature, and air velocity Total VOCs are measured by a flame ionization detector using EPA Method 25A. The opacity is determined by an optical system which measures light diffraction and uses fiber optics to transmit this measurement to a sensor The air velocity is measured by a vane anemometer which is connected to a transmitter The relative humidity and temperature are measured by a special probe and transmitter

5.2 Feed Preparation

Based upon site characterization data, limited feed preparation will be required The feed preparation for this project will include the manual separation of objectionable debris from the contaminated soil The IRV-150 LTTDS can handle debris up to 12 inches in diameter This process will help maintain the efficiency of the LTTDS by creating a consistent feed size for batch processing Soil will be prepared on a batch basis to equal the estimated throughput of the LTTDS

5.3 LTTD System Efficiency

Each LTTDU consists of a treatment chamber which will hold up to approximately 4 5 cubic yards of soil The soil will be treated over a prescribed duration Four (4) of these units will be used at the site and will be operated a minimum 20 hours per day This configuration will provide an approximate capacity of 60 cubic yards per day as measured by the tray capacity

Based upon past projects which used the LTTDS, the expected downtime is 16 7% or an average of four hours per day per LTTDU Downtime is attributed to performing general maintenance, obtaining parts, and making adjustments to system controls While a unit is experiencing downtime, the other LTTDUs will continue to operate In addition, contracts with local vendors and maintenance companies will be executed in order to address any mechanical difficulties which may arise

The LTTDS can remove at least 99% by weight of the toxic volatile organic substances (TVOS) from the contaminated soil The LTTDS has proven to be effective in removing at least 99% of heavier hydrocarbons from soil contaminated with #2 fuel oil The condenser system can remove up to 80% by weight at saturated vapor pressure of the semi-volatile organic compounds (SVOCs) from the LTTDS air stream exhaust and up to 60% by weight at saturated vapor pressure of volatile organic compounds (VOCs) prior to being discharged into the atmosphere Actual removal efficiency is a function of the partial pressure of the contaminant and will vary depending upon the contaminant level in the soil The GAC can remove up to 95% of the residual VOCs The removal efficiency of the GAC is also influenced by the contaminant level in the soil

The residence time for this project will be determined during the course of the shakedown and baseline run The soil selected for the baseline run test should be representative of the worst case of materials to be treated (e g , moisture content and concentration of contaminants) The soil used in the shakedown run should be clean soil known to be free of any contamination

5.4 Electrical Requirements

The electrical requirements for the proposed LTTDS are presented in the following table All electrical power and distribution panels will be provided by RMRS Attachment-F presents the Electrical Plan All wiring is specified to NEC standards and the RFETS requirement for 75°C insulation

Table-6 Electrical Requirement Summary Table

Component	No.	HP	Volts	Phase	Hz	NEC
Blower	2	75	460	3	60	96
Chiller	3	120	460	3	60	548
Pump	1	30	460	3	60	40
Blower	1	15	460	3	60	21
HEPA Pre-Heater	2	72kw	460	3	60	90 4
Hydrocarbon Analyzer	1	NA	110	1	60	20

Table-6 Electrical Requirement Summary Table						
Utility Outlets	6	NA	110	1	60	20
Monitor Controllers	2	NA	110	1	60	20

The LTTDS will require 480V, 3-phase, and an electrical feeder with a total amperage of 1200

5.5 Propane Supply

Propane tanks and the main supply lines will be provided by RMRS There will be a storage capacity of 8,000 gallons minimum Vapors will be regulated A vaporizer provided by McLaren/Hart will be used to ensure an adequate supply of vapors (80 gallon/hour) Piping from the RMRS propane supply tanks will be three-quarter (3/4) inch schedule-40 black iron pipe The vaporizer will be connected at the termination point and a one (1) inch flexible high pressure gas hose will be used as necessary to extend the propane supply from the vaporizer point to the distribution manifold Two (2) inch high pressure flexible hose will be manifolded off the vaporizer A one (1) inch high pressure flexible hose will be manifolded off the two (2) inch distribution manifold to each of the LTTDUs The two (2) inch distribution line will have a pressure regulator set at 12-14 psi to supply propane to each group of the LTTDUs A low pressure regulator set as 4-6 psi will regulate propane to the distribution manifold on each LTTDU

5.6 Condensate Collection, Storage and Management

Condensate will be transferred from the condensers to a 6,000 gallon double walled carbon steel tank for temporary storage and settling of particulates using a one and one-half inch air diaphragm pump The condensate will be pumped to the RMRS 10,000 gallon storage tanks using a one (1) inch air diaphragm pump

Flanged connections will be made at each of the RMRS tanks using 4 inch flanges rated at 150 psi connected into MNPT 4 x 2 bushing Hose connections will be made into an elbow using a threaded female cam lock fitting

5.7 Illumination

The site will be illuminated using at least four (4) combination light plants and power generators Each light plant has four metal halide lamps on a mast which can be extended 12 - 30 feet Each lamp

produces 0 5 foot candles of light and will illuminate up to 82,000 square feet Three plants will provide a combined illumination of 6 0 foot candles over an 82,000 square feet area

6.0 STANDARD OPERATING PROCEDURES FOR MOUND SITE LTTD OPERATIONS

6.1 Purpose

The purpose of these standard operating procedures is to establish the basis for the standardization of procedures for the conduct of operations associated with the thermal treatment of Mound Site Soil The intent of these standard operating procedure is to ensure conformance to established policies and procedures for conducting such operations at the Rocky Flats Environmental Technology Site

6.2 Objective

The objective of the standard operating procedures is to ensure that all operations are conducted in conformance to the statement of work and that quality control is applied to every aspect of this operation This document may be modified as needed to satisfy this objective

6.3 Pre-Project Submittals

This section describes the submittals required under the statement of work prior to beginning onsite operations These submittals will provide the guidance for conducting their related project task

6.3.1 Health and Safety Program

The McLaren/Hart Health and Safety Program Manual has been amended to conform to the requirements established for the RFETS This document will govern the administration and

execution of health and safety policies, procedures, and programs used by McLaren/Hart A copy of this manual will be maintained onsite for review and reference as needed No modifications or amendments can be made to this document without approval by both RMRS and McLaren/Hart

6.3.2 Health and Safety Plan

The McLaren/Hart Site-Specific Health and Safety Plan (HASP) has been approved by McLaren/Hart, RMRS, and RFETS Radiological Engineering Multiple copies of this plan will be maintained onsite for review and reference as needed This document will govern the health and safety aspects of the conduct of operations during the execution of this project The HASP can be amended and modified as necessary to address new and/or changing conditions All amendments and/or modifications must undergo a formal review and approval process by McLaren/Hart, RMRS, and RFETS Radiological Engineering before any such changes can be implemented Only controlled copies with fully executed signature pages will be acceptable

6.3.3 Electrical and Mechanical Plans

The electrical and mechanical plans have been submitted and approved by RMRS The McLaren/Hart LTTDS will be installed according to these approved plans No modifications to the approved plans can be made without the approval of RMRS, McLaren/Hart, and RFETS authorized personnel Any such modifications cannot be implemented prior to this approval Copies of any approved modifications will be maintained onsite for review and reference Documentation of any such changes will be maintained in the project files

6.3.4 Training and Qualification Records

A training matrix has been submitted to and approved by RMRS documenting that all personnel have met the necessary training requirements for their job title A copy of this matrix will be maintained onsite for review and reference Any personnel whose training records indicate that they are near an expiration date will have that affected training class highlighted Those personnel will complete an update to this requirements at least two weeks in advance of the expiration date Copies of the certificates for training, medical clearance, drug screening, and fit test will be maintained onsite in the project personnel records

A qualifications matrix has been submitted and approved by RMRS demonstrating that assigned personnel meet the minimum requirements specified in the SOW Copies of reference checks and brief experience profiles will be maintained onsite in the project records These records will be updated as necessary to document any new or additional qualifications

6.4 Health and Safety

The conduct of operations will follow the guidelines given in the Site-Specific HASP All assigned personnel are required to sign-off on an acknowledgment sheet after receiving instruction on the HASP Subsequently, all assigned personnel are required to comply with the requirements set forth in the HASP Failure to follow the requirements of the HASP can result in progressive disciplinary action up to and including suspension from the job site

Any modifications and amendments to the HASP must be reviewed by all assigned personnel Each assigned personnel is required to sign-off on any and all amendments or modifications to the HASP before continuing with operations

Documentation of personnel acknowledgment of having reviewed and/or approved the HASP and amendments and/or modifications will be maintained in the project records No personnel who have not reviewed the HASP and modifications and/or amendments or who fail to acknowledge that they understand the HASP and any amendments or modifications will not be permitted on the job site until that person clearly understands the HASP and its requirements

A daily tailgate safety meeting will be held for each shift before beginning site activities This meeting will be conducted by the Site Safety Officer (SSO) This meeting will address both general health and safety issues and specific safety issues and specific issues related to the safe conduct of operations All personnel are required to attend this meeting and sign-off on an attendance sheet These attendance sheets will be maintained in the project records

Each day, an individual from the operations crew will give a short safety presentation on a job specific topic The purpose of this procedure is to encourage active participation in maintaining a safe work site At the end of the project, three cash safety awards will be given in the amount of $300, $150, and $75 The amount will be given based upon peer review and recognition for their contributions to a safe job

6.5 Operations of the IRV-150 LTTDS

6.5.1 Setup of the IRV-150 LTTDS

The IRV-150 LTTDS will arrive onsite in modular form Each of two skid units will come fully assembled so that the only connections required for setup and operations will be for the ductwork, instrumentation and control, condensate transfer and electrical power supply Each skid will consist of a condenser, pre-heater, HEPA filter, and vacuum blower

The remainder of the setup and operation will be conducted according to the procedures

outlined in the IRV-150 Operators Manual

6.5.2 Operator Aids

The following operator and/or instruction manuals will be maintained onsite for review and reference as necessary to ensure proper operation and maintenance of individual components of the IRV-150 LTTDS

(1) Fisher Controls Instruction Manual, Series 64 and 67 LP-Gas Regulators

(2) Equimeter Inc Regulator Installation and Maintenance Instructions, 143-80 Service Regulator

(3) Equimeter Inc General Safety Instructions for Gas Regulators

(4) Newport Electronics, Inc , HX11, HX12, and HX13 Relative Humidity/Temperature Transmitters

(5) Chicago Blower Corporation, Safety-Installation-Operating and -Maintenance Instructions Design 53 Pressure Blowers

(6) Westinghouse, Instructions for A200, Size 3 or 4, 3 Pole Motor Controller

(7) Ashcroft, Instructions for the Installation and Use of the Ashcroft B - Metal Thermometer

(8) Ashcroft, Industrial XLDP Low Pressure Transmitter Installation Instructions

(9) ALGAS Industries Inc , Installation Operations and Maintenance Manual, 40/40H and 80/40H Direct Fired LP Gas Vaporizers

(10) Dwyer Instruments, Inc , Operating Instructions and Parts List, Magnahelic Differential Pressure Gage

(11) Dwyer Instruments, Inc , Air Velocities with the Dwyer Pilot Tube

(12) Setra, Operating Instructions Series C230 Pressure Transmitters

(13) Dwyer Instruments, Inc , Specifications-Installation and Operating Instructions Series 640 Air Velocity Transmitter

(14) WIKA Instrument Corp , Installation and Operating Instructions for Model 89X 13XXX and 89X 23XX0 Piezoresistive Transmitters

(15) Watlow Process Systems, Control Panel Installation and Maintenance Manual

(16) Datatest, Instruction Manual Model 90A/90AS Visible Emissions Monitor

(17) Watlow Controls, User's Manual Series 988 1/8 DIN Microprocessor-Based Temperature/Process Controller

(18) Watlow Power Controls, User's Manual DIN-a-mite Style C Solid State Power Control

(19) Watlow Controls, User's Manual Din Rail Mount Limit or Temperature control Series 92

(20) Thermo Environmental Instruments Inc , Model 51, Heated Total Hydrocarbon Analyzer Instruction Manual

(21) Japan CBM Corporation, Citizen Dot Matrix Printer Model iDP3535 User's Manual

(22) Crane Deming Pumps, Installation, Operations and Maintenance Manual 2150 Series 1 1/2" Ported Air Operated Diaphragm Pump

(23) Crane Deming Pumps, Installations, Operation and Maintenance Manual Series 2100 1" Ported Air Operated Diaphragm Pump

(24) Honda Power Equipment, Owner's Manual Trash Pump WT20X, WT30X, WT40X

(25) Wilkerson Corporation, Installation and Maintenance Sheet Lubricator Model L18 and L28

(26) Barneby and Sutcliffe Corp , Operating Guide for Filter Installation, Filter Change, Maintenance, and Spare Parts for Series C, Series CM, and Series KE Bag-In, Bag-Out Housing

(27) McLaren/Hart, IRV-150 Operators Manual

(28) Watlow Anafaze, MLS Series User's Guide

(29) Watlow Anafaze, AnaWin™ User's Guide

(30) Trane RTAA-IOM-3 Installation, operation, and maintenance manual, Air Cooled Series R Rotary Liquid Chillers

(31) RMRS, Job Aid JA-MND-001, Condensate Tanks T-101 and T-102 Operating Instructions

6.6 Plan of the Day

The Plan of the Day will be prepared by the Project Manager and posted on the daily activities board in the field office trailer A meeting will be held daily at the beginning of each shift All assigned personnel are required to attend An attendance sheet will be maintained for each shift and signed by all attendees No one will be allowed to work onsite without having received and/or reviewed the contents of this meeting

The Project Manager and/or his designee will conduct the meeting The Site Safety Officer and/or lead Health and Safety Specialists will present a daily tailgate safety briefing during this meeting

Specific task and job assignments will be made A discussion of the site operations activities will be presented Operations activities which may be included are as follows

(1) Treatment activities and special requirements

(2) Maintenance and repair activities

(3) Waste transfer operations

(4) Emergency shutdown procedures

(5) Alarm checks, tests and inspections

(6) Special test (i e DOP test, collection of SUMMA Canisters)

(7) Safety equipment checks, tests and inspections

(8) Sampling activities and requirements

(9) Job specific safety briefing

(10) Lockout/Tagout actions

(11) Tours and audits

(12) Job task related training

(13) Other planned activities

(14) Material, equipment and personnel requirements for specific tasks

The Shift Supervisor and SSO will ensure that all activities are conducted according tot he Plan of the Day A written record with the signatures of these personnel in attendance will be maintained in the project records

6.7 Shift Operating Rounds

The Project Manager, Shift Supervisor, SSO and QA/QC technician will conduct periodic rounds of the job site and LTTDS for the purpose of inspecting and monitoring conformance to establish procedures and/or operating practices Controlled logbooks will be maintained by each responsible individual

6.7.1 Project Manager

The Project Manager will conduct a daily inspection of the jobsite and consult with the SSO, SS, and QA/QC technicians to ensure that all appropriate logs and records are being maintained Any issue resulting from this inspection will be documented along with the resolution of those issues An action item notice will be issued if warranted, with a specific tie for completion and compliance with the notice

6.7.2 Shift Supervisor

The SS is responsible for ensuring that all action items for his/her shift are promptly responded to and documented and that operations are conducted according to the workplan and POD The SS is responsible for ensuring that all shift operations personnel are advised of any and all applicable action item notices and for obtaining the signature of all affected personnel as having received, understood, and complying with any such notice The SS is responsible for requesting any assistance deemed necessary for complying with the action item notice

6.7.3 Site Safety Officer

The SSO is responsible for conducting operating rounds to ensure compliance with the HASP, POD, tailgate safety briefing, Radiological Engineering Control Manual, and RFETS Health and Safety Policies The SSO will issue action item notices, if warranted, and/or stop work notices for any new or changing conditions and/or unsafe operations

The SS and PM will be advised promptly of any situation as discussed previously The PM and SS will ensure that the conditions are promptly mitigated in order to maintain a safe working environment

6.7.4 QA/QC Technician

The QA/QC technician is responsible for maintaining operations data relevant to the controlled operation of the LTTDS The QA/QC technician will issue action item notices to the PM, SSO, and SS as warranted for any out-of-control conditions

The PM, SSO and SS, as applicable, will promptly respond to any such notifications and provide a written response documenting the necessary corrections have been made The QA/QC technician will provide a written response to any action item notice that the PM or SS might make

NOTE

All shift operating rounds will be documented and maintained in the project records

6.8 Lockout/Tagout Procedures

Any and all work associated with the maintenance of the IRV-150 LTTDS which poses a threat or risk to the safety of the assigned personnel The environment, and or equipment due to the unexpected energization, startup, release of stored energy, or release of hazardous material from the equipment will require lockout/tagout (LO/TO) of the affected equipment This activity will follow the guidelines set forth in the RFETS lockout/tagout procedure 1-15320-HSP-2 08 This includes all applicable requirements for requesting a LO/TO, work under a LO/TO, removing LO/TOs, altering boundaries, corrections, corrective actions, and training requirements No one shall operate equipment that is under a LO/TO

All assigned personnel shall receive instruction in the LO/TO procedure Records documenting having received LO/TO training will be maintained in the project records

The PM is responsible for ensuring that the LO/TO procedures is followed The SSO will complete the documentation for the LO/TO and ensure that all affected personnel meet the training requirements The maintenance activity will be undertaken only upon completion of the review, verification, approval, and issuance of a LO/TO form RMRS

A copy of the LO/TO procedure shall be maintained onsite in the field office trailer This procedure is available for all personnel to review

6.9 Control of On-Shift Training

This procedure addresses the requirements set forth in RFP 1-31000-COOP-003, Conduct of On-Shift Training, for developing, enhancing, and verifying the skills and knowledge of shift operations and support personnel This procedure shall be used in conjunction with the daily operations plan and tailgate safety meeting to ensure that assigned personnel are qualified to properly and safely perform assigned tasks On-shift training shall be conducted so that shift personnel receive training on the job and as much operating experience as possible

The PM, SS, SSO and lead HSS's will conduct training as necessary for new job assignments and/or operations not previously addressed in any of the other training programs All affected personnel will participate in the on-shift training before undertaking a new job assignment and/or operation

The SSO will maintain record documentation of all training in the training matrix files These records will be updated after each training event with sign-in sheets, course content, and instructor

6.9.1 Training Procedure

All personnel will participate in on-the-job training for safe and efficient operation of the IRV-150 LTTDS This training will be a systematic approach to the operations of the IRV-150 LTTDS and include the following

(1) The theory of operations
(2) Design components and function
(3) Normal operating parameters
(4) Maintenance operations and procedures
(5) Routing operating procedures
(6) Special operating procedures
(7) System operating safety
(8) Emergency shutdown procedures
(9) Return to operation procedures
(10) Weekly shutdown procedures
(11) Weekly startup procedures

All affected personnel shall attend these training sessions This training will include classroom instruction, oral examination, and performance evaluation

Each day a special safety and operations topic will be presented during the tailgate safety meeting and operations briefing The PM, SS, SSO, and lead HSS's will provide continuous performance evaluation of assigned personnel Remedial instruction will be given to assigned personnel who fail to meet satisfactory performance criteria as determined by on-shift oral

examination

6.10 Shift Relief and Turnover

This procedure follows the requirements set forth in RFP 1-31000-COOP-007, Shift Relief and Turnover, for establishing the requirements, guidelines and actions to be taken to during shift relief and turnover to ensure effective communication of the IRV-150 LTTDS performance and operating parameters, routine and scheduled shift activities, and unusual or abnormal conditions This procedure shall be followed at all times

The PM will established and maintain a list of operations and the support groups requires for shift relief and turnover He or she will review and approve or reject exceptions to this procedure The PM will assign site safety and monitoring requirements to the SSO and IRV-150 LTTDS operations requirements to the SS The QA/QC technicians will be assigned specific requirements relevant to maintaining quality control on the operation and performance of the IRV-150 LTTDS

The PM, SS, SSO and QA/QC technicians will interact during a shift relief and turnover briefing Each offgoing SS, SSO, and QA/QC technician will prepare brief shift operations reports and detailing events and/or activities related to their job function and brief his/her relief on the status of his/her related job assignment

The PM will ensure that this shift relief and turnover is effectively implemented The PM also will maintain awareness of the IRV-150 LTTDS and process operating parameters, routine and scheduled shift activities, and off-normal conditions

6.11 Communications Criteria

This procedure will be followed for ensuring a complete and consistent exchange of information and instruction This procedure will follow the instructions and guidelines set forth in RFP 1-31000-COOP-015

The PM will ensure that the communications criteria in this procedure is implemented, that communication equipment is adequate, available, and maintained, and periodically survey the job site to ensure that all personnel can be alerted to emergency situations

All operations and support personnel will conduct operational communication in accordance with this procedure and report and defective communication equipment Operations and support personnel will ensure that each communication contains information or directions necessary to successfully achieve the desired result

All personnel will be briefed on the requirements of this procedure and monitored for compliance with

the specific instructions This will be included as part of the indoctrination of all assigned personnel The life safety/disaster warning system will be fully explained to all assigned personnel

6.12 Pre-Evolution Briefing

This procedure established the process for preparing, scheduling and conducting Pre-Evolutions Briefings to identify and address Conduct of Evolution to mitigate potential impacts to the public health, safety or the environment resulting from a scheduled evolution This procedure applies to the conduct of operations of the IRV-150 LTTDS and associated activities only and shall follow the applicable requirements set forth in RFP 1-31000-COOP-011

6.13 Quality Control

The parameters for process quality control of the IRV-150 LTTDS operations at the mound are presented in the following table

Table 7: Summary Table
IRV-150 LTTDS
Process Quality Control

Soil Treatment Temperature	
Target Temperature	180°F
Residence Time	30 minutes
Dry Particulate Filter	
Normal Differential Pressure	< 25 inches W C
Change Out Differential Pressure	≥ 25 inches W C
HEPA filter	
Baseline Differential Pressure	1 5 inches W C
Warning Differential Pressure	5 inches W C
Shutdown / Change Differential Pressure	9 inches W C
Condenser	
Chill Water Inlet	20-35°F
Chill Water Outlet	25-40°F
Outlet Air	25-45°F
LTTDU Vacuum Chamber	
Normal Vacuum	≤ 25 inches W C
Abnormal Vacuum-Clean Screens	> 25 inches W C

Air Flow	
Total System	3200-4800 CFM
Each ½ System	1600-2400 CFM
FID	
Normal	≤ 84 ppm
Abnormal	> 84 ppm
Opacity	
Warning	≥ 10%
Stop Work	≥ 15%

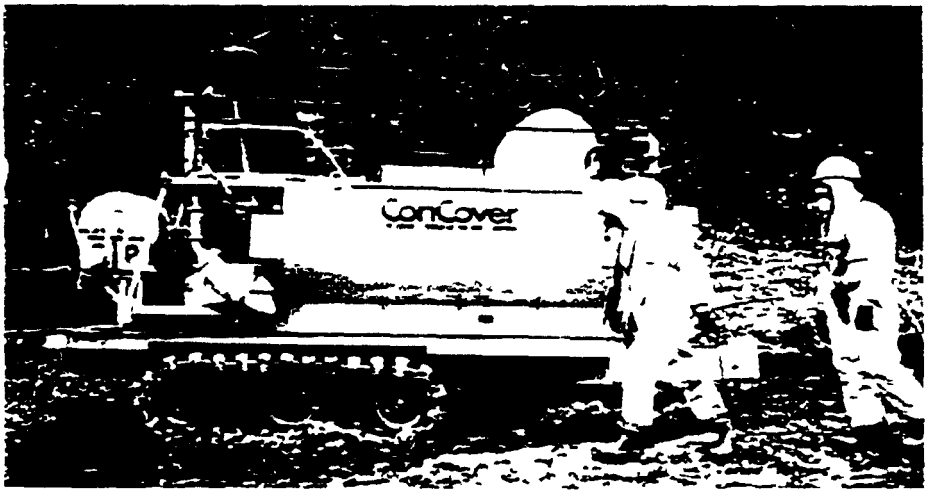
ATTACHMENT A

Remediation Products from New Waste Concepts

ConCover® Remediation Cover

ConCover® Remediation Cover Forms A Protective Layer Over Toxic Materials, Keeping VOCs, Dust And Odors From Escaping Into The Environment

ConCover® Remediation Cover is a technologically advanced blend of polymers and recycled fiber that forms a slurry when mixed with water. The slurry can be spray applied to smooth or irregular surfaces, steep slopes or vertical walls. ConCover Remediation Cover forms a uniform encapsulating layer between contaminated materials and the environment, suppressing VOCs, dust and odors.



Effective Protection

ConCover Remediation Cover provides reliable protection for two to three months, depending on climatic conditions. It forms a barrier that not only controls VOCs, dust particulates, odors and Radon, but also prevents runoff contamination.

Environmentally Friendly

ConCover Remediation Cover is biodegradable, non-flammable and non-toxic to workers. It is rated 0 (nonhazardous) for health, fire and reactivity. It adds no contamination to the site.

Application

ConCover Remediation Cover arrives on site in two dry components. The dry components are combined and mixed with water in the ConCover All Purpose Sprayer (CAPS). The resulting slurry can be sprayed up to 200 feet using the cannon mounted on the CAPS. This sprayer also features an integrated hose reel for hand applied cover and may also be used for power washing/decontamination, dust control, fire fighting and revegetation. Set up and cleaning time is minimal.

On-Site Training

Our OSHA certified field supervisors will train your operators in product preparation and equipment usage. CAPS spray equipment is available for short or long term lease from New Waste Concepts for the duration of your project. Our staff also follow up with site visits to make sure you get the maximum benefit from our products.

Let Us Evaluate Your Site

If you'd like to put ConCover Remediation Cover to work on your remediation projects, call us today. We'll evaluate your site condition and determine how ConCover Remediation Cover can be applied to meet your specific needs.

For more information, including test reports and case histories, call New Waste Concepts at 800) 359-2780.

Supporting test reports available include MSDS, TCLP, VOC Suppression Test, Water Runoff Quality Test and pH Test.

NWC
NEW WASTE CONCEPTS

New Waste Concepts, Inc
160 C Lavoy Road
Erie, Michigan U.S.A. 48133
Phone (313) 847-8997 or (800) 359-2780
Fax 313) 847-9008

ConCover®

Remediation Cover

Description: ConCover® is a technologically advanced blend of polymers and recycled fiber that forms a slurry when mixed with water. Spray applied to smooth or irregular surfaces, steep slopes or vertical walls, ConCover forms a uniform encapsulating layer between the waste and the environment, providing reliable coverage in a variety of climate conditions. VOC's and dust particulates are contained immediately by this slurry barrier.

Uses:
- Short-term cover
- Long-term cover (depending on precipitation conditions)
- Barrier to prevent run-off contamination
- VOC suppression
- Odor suppression
- Dust suppression

Benefits:
- Controls odors, volatile organic compound (VOC) emmisions, ash, dust and fire
- Biodegradable and non-flammable
- 0 rating (nonhazardous) for health, fire and reactivity
- No detection in every category of the Toxicity Characteristic Leaching Procedure (TCLP)
- Includes recycled materials

Application:
- Arrives at site in 2 dry components
- Mix with water in CAPS (ConCover All Purpose Sprayer) machine
- Machine will cover distances up to 200 feet
- Integrated hose reel allows for hand applied cover
- CAPS machine is also utilized for power washing/decon, dust control, fire fighting and seeding
- Minimal set-up and/or clean-up time

The New Waste Concepts Remediation Group develops and markets innovative solutions to global environmental challenges. Our technically advanced products aid in the remediation process in an environmentally safe and accepted manner. Governmental acceptance in North America, Europe, and Asia.

Remediation Group
160 C Lavoy Road
Erie, MI 48133
(313) 847-8997
(800) 359-2783
FAX (313) 847-9008

NWC
W WASTE CONCEPTS

1 C LAVOY ROAD
E M 48120
A
3/847 8997
359 2780
847 9008 FA

MATERIAL SAFETY DATA SHEET

Trade Name ConCover® 'A' Bag

Section I General Information

Item Name: Earthen material blend/natural cellulosic polymer
Final product is a fibrous slurry
Classification = 2508 10 0000

Manufacturer: New Waste Concepts
160 C Lavoy Road
Erie Michigan 48133
313 847-8997

Date MSDS Prepared: January 10, 1995
Last Review Date: October 25, 1995
MSDS Preparers Name/Address: Prepared by manufacturer

Unit of Issue/Container Type: Tote sacks or re-pressed paper bags - various weights

Product Description: Binding material blended with natural earthen materials biodegradable organic compounds with other inert materials and fibrous cellulose based materials. Respirable dusts are present.

Section II Ingredient/Identity Information

Proprietary (Y/N): Y

Ingredient	Composition (%)	CAS #	Exposure Limits (TWA)
silica or crystalline quartz	2-6 <2 respirable	14808-60-7	0.5 mg/m³ OSHA PEL
non-toxic respirable dust	n/a	n/a	15 mg/m³ OSHA PEL 10 mg/m³ ACGIH TLV 5 mg/m³ (resp fr OSHA)

Section III Physical/Chemical Characteristics

Appearance and Odor: Grey/white fine powder with no distinctive odor

Boiling Point	n/a
Melting Point	n/a
Vapor Pressure	n/a
Vapor Density	n/a
Specific Gravity	n/a
Decomposition Temperature	n/a
Evaporation Rate	n/a
Solubility (H_2O)	n/a
Percent Volatiles by Volume	0
Viscosity	n/a
pH	n/a

Section VII Precautions for Safe Handling and Use

Personal Protective Equipment (Routine Use)

Respiratory Protection Respirators are not required when using this product under routine outdoor conditions In cases when excessive dusts might be periodically created use NIOSH/MSHA approved full or half face respirators with dust cartridges when pouring and mixing product

Gloves Recommend latex butyl rubber or nitrile gloves

Eye Protection Safety goggles or glasses recommended

Other Recommend Tyvek suits or coveralls

Work Practices	This product is to be used in outdoor environments Exposures to hazardous components are not expected to exceed permissible limits during routine daily use Minimize dusting whenever possible Do not use this product in confined or enclosed environments Do not use in the presence of flames or sparks
Ventilation	If routine indoor use is required or in the presence of excess dust generation local exhaust ventilation is recommended
Spill/Release Procedures	Excess spilled product if uncontaminated may be cleaned and disposed of as ordinary waste No special clean up procedures are recommended
Neutralization Procedures	n a
Waste Disposal Procedures	This material is not a listed hazardous waste nor does it exhibit any hazardous waste characteristic
Storage/Handling Procedures	Store product in a dry environment away from strong bases and oxidizers
Other Health Hazard Precautions	Use proper lifting procedures when attempting to dispense product from 50 lb bags

Reviewed/Approved Date 11/5/96

Thomas J Nachtman
President

NWC

v "ASTE CONCEPTS

C LAVOY ROAD

M 48133

A

3 /847 899?

254 2780

3 847 9008 F

MATERIAL SAFETY DATA SHEET

Trade Name ConCover® "B Bag

Section I General Information

Item Name	Recycled paper and fiber
Manufacturer	New Waste Concepts Inc 100 C Lavoy Road Erie MI 48133 313 847-8997
Date MSDS Prepared	August 10 1995
Last Review Date	August 10 1995
Msds Preparers Name Address	prepared by manufacturer
Unit of Issue/Container Type	Reinforced paper bags 25 lb
Product Description	Recycled cellulose
Multiple Part Product Y/N	
Description of Related Component	ConCover® A Bag

Section II Ingredient Identity Information

Proprietary Y/N Y

Section III Physical/Chemical Characteristics

Appearance and Odor	Fiberous with brown to natural green color
Boiling Point	N/A
Melting Point	N/A
Vapor Pressure	N/A
Vapor Density	N/A
Specific Gravity	N/A
Decomposition Temperature	N/A
Evaporation Rate	N/A
Solubility H20	Slightly Soluble
Percent Volatiles by Volume	N/A
Viscosity	N/A
pH	N/A
Radioactive Y/N	N
Ferromagnetic (Y/N)	N

Waste Disposal Procedures	This material is not hazardous nor does it exhibit any hazardous waste characteristic
Storage/Handling Procedures	Store product in a dry environment away from strong bases and oxidizers
Other Health Hazard Precautions	Use proper lifting procedures when attempting to dispense product from 25 lb bags

Reviewed and Approved/Date

Thomas J. Nachman
President

NWC
w Waste Concepts

[illegible] Lavoy Road
[illegible] M 48[illegible]
[illegible] 847 8997
[illegible] 354 2780
[illegible] 847 9008 Fax

TCLP Zero Headspace Extractor ConCover®

	Units	Result	Detection Limit
Multicomponent analysis TCLP Volatile			
Benzene	mg/L	Not Detected	0.0006
Carbon Tetrachloride	mg/L	Not Detected	0.002
Chlorobenzene	mg/L	Not Detected	0.0006
Chloroform	mg/L	Not Detected	0.0006
1,4-Dichlorobenzene	mg/L	Not Detected	0.002
1,2-Dichloroethane	mg/L	Not Detected	0.00[illegible]
1,1-Dichloroethene	mg/L	Not Detected	[illegible]
Methyl Ethyl Ketone	mg/L	Not Detected	[illegible]
Tetrachloroethene	mg/L	Not Detected	[illegible]
Trichloroethene	mg/L	Not Detected	[illegible]
Vinyl Chloride	mg/L	Not Detected	[illegible]
TCLP non-Volatile Extraction			
Multicomponent analysis TCLP Metal			
Arsenic	mg/L	Not Detected	[illegible]
Barium	mg/L	Not Detected	[illegible]
Cadmium	mg/L	Not Detected	[illegible]
Chromium	mg/L	Not Detected	[illegible]
Lead	mg/L	Not Detected	[illegible]
Mercury	mg/L	Not Detected	[illegible]
Selenium	mg/L	Not Detected	[illegible]
Silver	mg/L	Not Detected	[illegible]
Multicomponent analysis TCLP Phenolics			
o-Cresol	mg/L	Not Detected	[illegible]
m-p-Cresol	mg/L	Not Detected	[illegible]
Pentachlorophenol	mg/L	Not Detected	[illegible]
2,4,5-Trichlorophenol	mg/L	Not Detected	[illegible]
2,4,6-Trichlorophenol	mg/L	Not Detected	0.002
Multicomponent analysis TCLP Base/Neutrals			
1,4-Dichlorobenzene	mg/L	Not Detected	0.00
2,4-Dinitrotoluene	mg/L	Not Detected	0.005
Hexachlorobenzene	mg/L	Not Detected	0.002
Hexachlorobutadiene	mg/L	Not Detected	0.002
Hexachloroethane	mg/L	Not Detected	0.002
Nitrobenzene	mg/L	Not Detected	0.00
Pyridine	mg/L	Not Detected	0.00
Multicomponent analysis TCLP Pesticides			
Chlordane	mg/L	Not Detected	0.02
Endrin	mg/L	Not Detected	0.04
Heptachlor	mg/L	Not Detected	0.008
Heptachlor Epoxide	mg/L	Not Detected	0.008
Lindane	mg/L	Not Detected	0.005
Methoxychlor	mg/L	Not Detected	0.001
Toxaphene	mg/L	Not Detected	0.06
Multicomponent analysis TCLP Herbicides			
2,4-D	mg/L	Not Detected	0.10
2,4,5-TP (Silvex)	mg/L	Not Detected	0.02

ConCover® All Purpose Sprayer
CAPS 900

Overview

The ConCover® All Purpose Sprayer is a versatile piece of landfill machinery that is used primarily for the application of NWC's alternative daily cover materials. The CAPS 900 is trailer mounted and was designed for working face applications between 1000 and 6500 square feet. The CAPS machine can also be used for dust control, erosion prevention, bird control, seeding, fire-fighting, power washing as well as applying other products developed by NWC.

Specifications

Engine:
Kubota Diesel - D1703, 34.5 horsepower (25.7 kw), 3 cylinder, water cooled. Low oil pressure and highwater temperature automatic shutdown.

Pump:
TARBY 2-TL8 progressive cavity pump
Rated 85 GPM, 200 PSI, at 700 RPM
Pump drive: hydraulic driven. (No belts, chains, or gears.) Pump drive is independent of agitator drive.

Agitation:
Mechanical paddle agitators and liquid recirculation
Variable speed reversible hydraulic motor drive
hydraulic pump-Kubota gear type, hydraulic motor-Danfoss gear roller, hydraulic valving-brand adjustable flow

Tanks:
Main - Resin coated 940 gallon capacity mixing tank
Flush - 60 gallon poly tank plumbed to main tank

Cannon:
Platform at rear with all controls and discharge cannon. Discharge distance up to 150 feet. Seven nozzles: long distance, narrow fan, medium fan, and wide fan.

Hose Reel:
Includes hose reel and 200 feet of hose.

Trailer:
Trailer with tandem 7000 lb. rubber torsion axles with fenders has electric brakes on both axles with break-away switch.
DOT lights including marker and identification lights and license plate bracket.
Adjustable 2 5/16" ball coupler or heavy duty eye hitch
1900 lbs. hitch weight
12 x 16.5 tubeless, load range F tires

Weight/Dimensions:
Empty weight: 5,210 lbs.
Working weight: 14,460 lbs.
Dimensions: 16'-2"L x 7'-1"W x 9'H

Options

additional agitator

crawler tracks

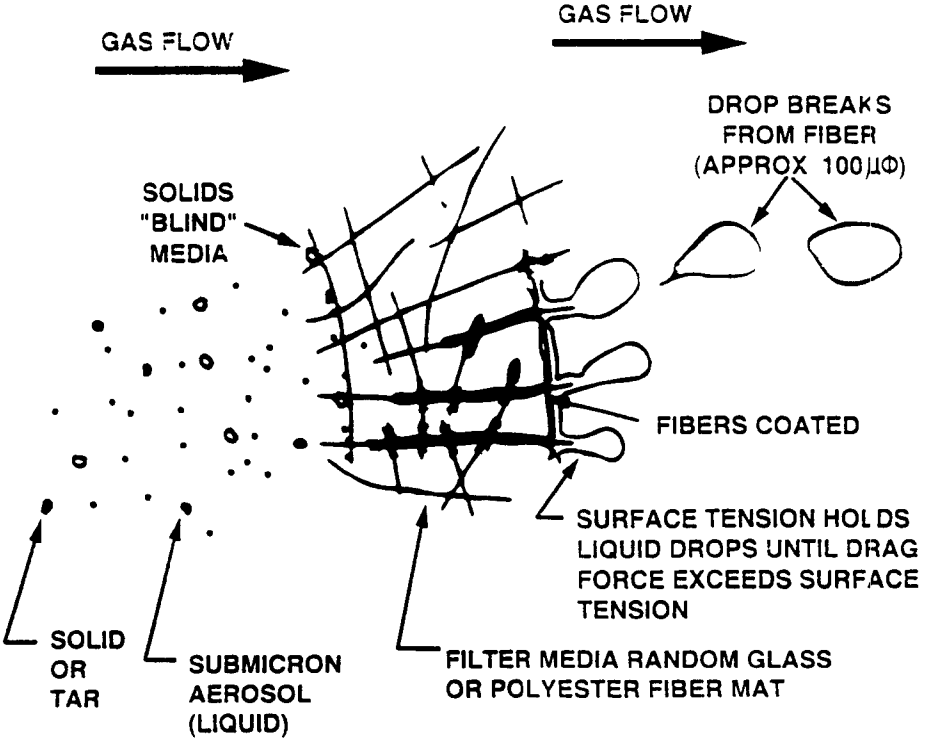
ATTACHMENT B

ATTACHMENT C

HEAF DISPOSABLE MEDIA HIGH EFFICIENCY AIR FILTERS

ne Andersen 2000 Inc HEAF air pollution control equipment line includes three different types of filtration devices for the removal of sticky oily or liquid aerosol particulate matter from exhaust gas streams VOC's (volatile organic compounds) often are present in this form These three units are the Mini-HEAF the Flat-Bed HEAF and the Rotary Drum HEAF The Mini HEAF is used for gas flows between 0 and 5,000 acfm at its inlet The Flat-Bed HEAF unit is used for gas flows from 500 to 15 000 acfm at its inlet The Rotary Drum or (DF) HEAF unit is used for gas flows from 9 000 to 100 000 acfm at its inlet All of these HEAF units operate using the same collection mechanism and the same filtration media The filter media is a fiberglass or polyester mat made up of random fibers having a diameter of approximately 7 microns and a density of 0 66 oz / ft^2 The gas is drawn through the filter media at a face velocity of between 1 300 and 1 800 ft min The filter media is about $^1/_8$ thick under these flow conditions Particulate matter impacts on the fibers and is separated from the gas stream Low viscosity liquids collected from the gas stream migrate through the filter media and are thrown off the back side of the filter media as larger liquid droplets See Figure 1 These droplets pass through the exhaust fan and are impacted on a mesh type mist separator at the fan exhaust The more viscous compounds which are collected on the filter media remain in the filter media and eventually begin to blind it off When gas flow through the filter media degrades to a predetermined level the filter media is changed either manually or automatically to expose fresh filter media to the gas stream

FIGURE 1
HEAF OPERATION



ATTACHMENT D

HERESITE
PROTECTIVE COATINGS®
INCORPORATED
ESTABLISHED 1935

Licensee of
SAKAGUCHI

September 1995

FINNED TUBE COATING SPECIFICATION

Finned tube coils shall be protected with a pure phenolic thermosetting resinous coating Metal preparation to provide a surface profile shall include degreasing and etching or phosphatizing by immersion.

The coating shall be applied in multiple coats by immersion After each immersion, the coating shall be partially cured in an oven. Following the final immersion and the application of one (1) spray coat, the coating shall be totally cured in an oven.

The total D.F.T. of the coating shall be approximately 2 mils, thereby providing good protection without adversely affecting heat transfer. D.F.T. varies depending upon fin spacing and the number of tube rows in depth. The coating shall withstand dry heat up to 205°C. (400°F.), and show no sign of attack after 3,000 hours of salt spray test to A.S T M Specification B117

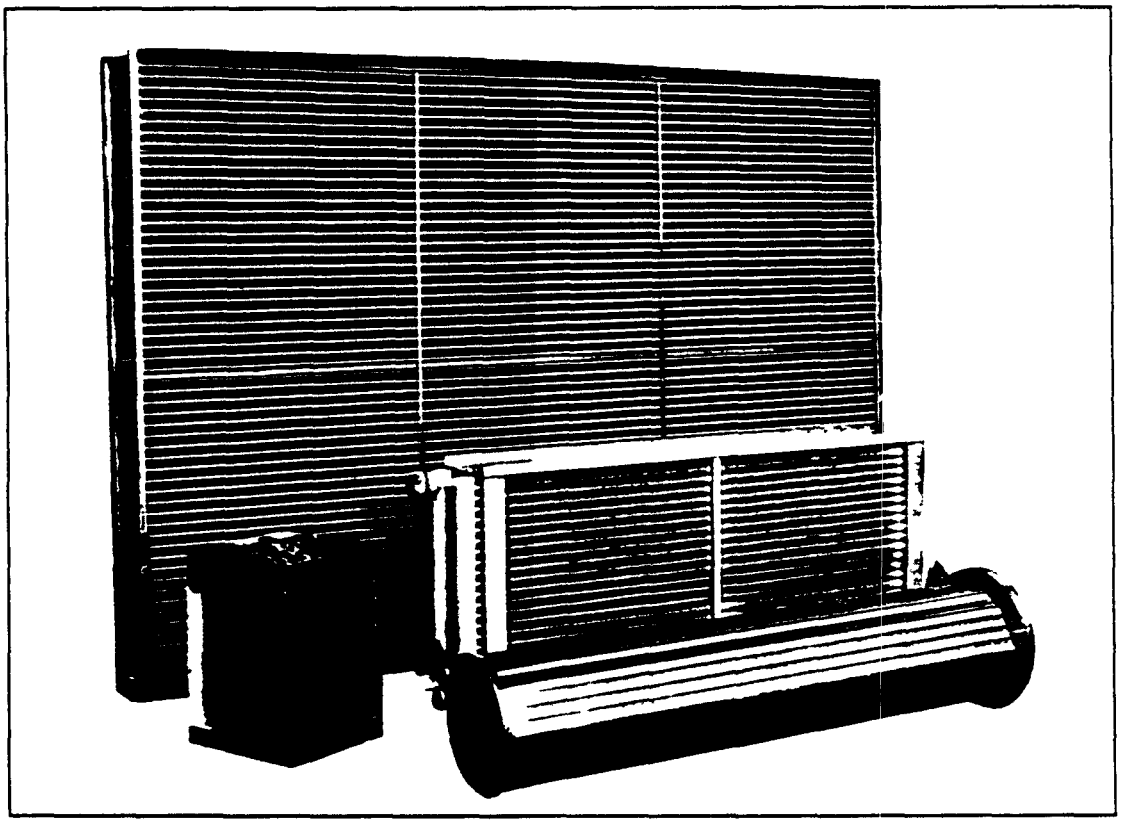
The coating shall be Heresite P-413 baking phenolic with plasticizer or approved equal

822 SOUTH 14th ST , MANITOWOC, WISCONSIN 54220
(414) 684-6646 FAX (414) 684-0110

Bulletin No 117
Rev 3-91

HERESITE®

THE LEADER IN CORROSION PROTECTION FOR FINNED TUBE COILS



HERESITE®

PROTECTIVE COATINGS INCORPORATED

822 SO. 14th STREET, P.O. BOX 250
MANITOWOC, WISCONSIN 54221-0250

TELEPHONE: 414-684-6646
1-800-558-7747

FAX: 414-684-0110

REPRESENTED BY

INTRODUCTION

The first HERESITE coating application to the exterior surfaces of finned tube coils took place in the early 1950s Since that time the HERESITE baking phenolic coating has effectively demonstrated its value in protecting heat transfer coils from corrosive attack, thereby appreciably increasing equipment service life The excellent chemical and temperature resistance coupled with the good heat transfer properties of the HERESITE coating have made possible the outstanding results being obtained.

HERESITE — DESCRIPTION

HERESITE is the registered trademark for our pure phenolic thermosetting resinous coatings

We feel it is important to emphasize that HERESITE baking phenolic coatings are manufactured and sold only by Heresite Protective Coatings and their representatives The application of the HERESITE baking phenolic coating to finned tube coils is performed at our plant in Manitowoc, Wisconsin and our licensees in the U S and Canada. Please contact us for these locations

HERESITE — ADVANTAGES

Practically all types of finned tube coils used for oil, water, air, gas and process cooling (and heating), as well as large condensing coils can be HERESITE protected against damaging environments The HERESITE coating of air-conditioning and industrial process coils exposed to corrosive fumes and salt atmosphere is on the increase, with many new applications being found.

HERESITE coating offers an economical alternative to the use of special metals for corrosive environments For example, we understand that aluminum fin coils coated with HERESITE are more economical than copper fin coils Special metal casing materials are unnecessary since the HERESITE coating is applied to the casing, as well as to the finned tubes Additionally, HERESITE coated aluminum fins will resist attack from most cleaning agents more successfully than copper fin coils It is noted that the HERESITE coating is applied to both plate fin coils, as well as spiral wound tubing

Over the years, HERESITE has pioneered and developed the quality coating that you can count on, accept no substitutes, specify HERESITE.

HERESITE — APPLICATION

The present day coating of finned tube coils with our P-413 plasticized brown baking phenolic coating is the result of many years experience during which time application equipment and procedures have been constantly improved. Today, enlarged facilities enable us to HERESITE coat, on a routine basis, coils which do not exceed the following size and weight limitations

Maximum Overall Dimensions = 204" long x 84" wide x 24" deep
Maximum Weight Per Coil = 3500 pounds per coil (approx.)
NOTE: Larger coils can be HERESITE coated using special procedures

Maximum Number of Fins Per Inch

1 row = 22 FPI	5 rows = 14 FPI
2 rows = 20 FPI	6 rows = 12 FPI
3 rows = 18 FPI	7 rows = 11 FPI
4 rows = 16 FPI	8 rows = 10 FPI

If your fin spacing, dimensions or weights exceed the above, please contact us. Fin design may affect the maximum number of fins per inch allowable

The HERESITE coating of finned tube coils is accomplished by multiple dipping and baking, resulting in complete coating coverage of the fins, tubes, headers, casings, etc., protection against corrosion is provided for the entire coil. Due to specialized surface preparation techniques, plus the good adhesive properties of the HERESITE P-413 coating, it is possible to efficiently HERESITE coat all the usual metals used in fabricating finned tube coils

HERESITE — TECHNICAL DATA

CHEMICAL RESISTANCE The HERESITE baking phenolic coating will withstand exposure to practically all corrosive and chemical fumes with the exception of strong alkalies such as sodium hydroxide, strong oxidizing agents such as aqua regia and concentrations of bromine, chlorine, and fluorine in excess of 100 parts per million. A chemical resistance guide is shown on the following page

TEMPERATURE RESISTANCE Maximum temperature resistance is 400°F. However, HERESITE baking phenolic coatings cannot be recommended for all chemical atmospheres at temperatures up to 400°F since corrosive activity and permeation may be greater at higher temperatures depending upon the chemicals involved. Excellent adhesion and flexibility enable HERESITE coating to withstand thermal shock. The HERESITE lining will operate at sub zero temperatures without loss of chemical and mechanical properties

THERMAL CONDUCTIVITY The HERESITE baking phenolic coating is a good thermal conductor and its thermal conductivity is expressed as approximately 2000 B.T.U. per hour per square foot per degree Fahrenheit based on an average 3 mil coating thickness. The "K" factor = 6.0

Coil manufacturers have indicated there is no need to add additional heating or cooling surface due to the presence of the HERESITE coating

A GUIDE TO THE CHEMICAL RESISTANCE OF HERESITE BAKED PHENOLIC LININGS

As indicated on Page 3, HERESITE baked phenolic linings will withstand exposure to practically all corrosive atmospheres with the exception of strong alkalies, strong oxidizers and wet bromine, chlorine and fluorine in concentrations greater then 100 ppm. Because the resistance of HERESITE is dependent upon conditions of service, environment, fabrication details plus other factors, Heresite Protective Coatings Inc should be consulted for specific recommendations

Heresite IS Resistant to Fumes of the Following:

acetates — all
acetic acid
acetone
acetylene
acrylonitrile
alcohols — all
aldehydes — all
alum
amines — all
ammonia
ammonium hydroxide
ammonium nitrate
aniline
benzoic acid
benzol
boric acid
brine
butane
carbolic acid
carbonates — all
carbon dioxide
carbonic acid
carbon monoxide
carbon tetrachloride
chlorides — all
chlorinated solvents — all
chlorine — less than 100 ppm
chloroform
chromic acid
citric acid
coke oven gas
esters — all
ethers — all
ethylene oxide
fatty acids
fluosilicic acid
formaldehyde
formic acid
freon
fuels — all
gases — inert
gases — manufactured
gases — natural
glycerine
glycols — all
hydrocarbons — all
hydrochloric acid
hydrogen
hydrogen sulfide
iodides — all
ketones — all
lacquers
lactic acid
maleic acid
malic acid
methanol
methylene chloride
naphthalene
nitrates — all
nitric acid (dilute)
nitrides — all
nitrobenzene
nitrogen fertilizers
oils, mineral and vegetable — all
oxalic acid
oxygen
phenol
phosphoric acid
propane
salicylic acid
silicic acid
steam vapor
stearic acid
sulfate liquors
sulfonic acid
sulfur dioxide
sulfuric acid
sulfurous acid
surfactants
tannic acids
tetraethyl lead
toluene
trisodium phosphate
urea
saltwater
water
xylene

Heresite IS NOT Resistant to Fumes of the Following:

aluminum fluoride
ammonium fluoride
aqua regia
bleaching compounds
brass plating solutions
bromine — over 100 ppm
bronze plating solutions
cadmium cyanide
calcium hypochlorite
caustic soda
chlorine — over 100 ppm
cyanide plating solutions
fluorine — over 100 ppm
hydrofluoric acid (conc)
hydrogen peroxide
hypochlorites
nitric acid (conc)
nitrogen oxides
potassium hydroxide
sodium fluoride (conc)
sodium hydroxide (conc)

NOTE: The statements made in this bulletin are based upon both research and experience and are believed to be entirely accurate However, no guarantee of their accuracy can be made for obvious reasons and no responsibility can be assumed by Heresite Protective Coatings Incorporated.

Printed in U.S.A.

ATTACHMENT E

(2)

duct Information

BARNEBEY & SUTCLIFFE CORP.

P.O. Box 2526
Columbus OH 43216
Facsimile 614 258 3404
Telephone 614 258 9501

BARNEBEY & SUTCLIFFE CORPORATION
RECOMMENDED SPECIFICATIONS
MODEL CM
BAG IN/BAG OUT FILTRATION HOUSING

The filter housings shall be Barnebey & Sutcliffe model CM, as manufactured by Barnebey & Sutcliffe Corporation. The top and bottom panels shall be manufactured from minimum 14 GA type 304 stainless steel with 2-B mill finish. The front and back panels shall each be constructed from a single piece of minimum 12 GA type 304 stainless steel with 2-B mill finish. (Type 304L, 316, 316L, and other stainless steel is available upon request.) Each housing shall be a side servicing bank-type arrangement. All seams and joints shall be welded and free of any sharp edges. All welds and welders shall be qualified in accordance with section IX of the ASME boiler and pressure vessel code. Welding procedures and personnel qualification reports shall be submitted to insure compliance with the requirement in accordance with section IX of the of the ASME boiler and pressure vessel code. Welding procedures and compliance with the requirement in accordance with section I. of the ASME boiler and pressure vessel code. The filter housings shall be reinforced to withstand +/- 10" w.g.

The prefilters, HEPA filters and carbon adsorbers shall be contained in bag-in/bag-out housings which shall be designed and constructed in accordance with the intent of ANSI-N509-1980.

Housings with two or more filter elements per tier shall have a filter removal rod to draw the filters toward the opening to facilitate bagging-out. The filter removal rod shall be operated through the filter change-out bag.

All mechanical components of the filter-locking mechanism shall be stainless steel except for a brass travel nut. The locking mechanism shall be located downstream of the filter elements. Filter elements are secured in place with top and bottom locking mechanisms, which are spring loaded to exert a sealing force of 1400 lbs. per filter element, applied as an even uniform load along at least 80% of the top and bottom of each filter element frame.

The housing shall have a removable access door for each tier of HEPA filters, carbon adsorbers and a separate access door for the prefilter. There shall be four access door retainers which secure the door in place.

T-1082
B/IE

Bagging Ring

Each tier of filter elements shall have a bagging ring located behind the access door The bagging ring shall be hemmed on its outer edge and have two continuous ribs around the perimeter

Bag-Out Bags and Straps

One bag-out bag shall be provided for each bagging ring located on the filter system. Each bag shall be amber in color, 008 inch thick PVC, with an elastic retaining cord located at the mouth The stock number of the specific bag shall be located at the retaining cord. Glove sleeves are incorporated into the bag to facilitate filter element removal One black nylon security strap and one black nylon holding strap shall be provided for each bagging ring located on the filtration system

Equipment Labels

The filtration system shall have an aluminum, painted label which lists pertinent information, as well as reordering information.

Testing

sing will be factory tested by the pressure decay method in accordance with ANSI-N510-1980 to 10" w g as specified in ANSI-N509-1980, Table 4-4 Each filter position shall be fitted with a blank filter and the filter-to-housing seal shall be tested by the pressure decay method in accordance with ANSI-N-510-1980 to 10" w.g as specified in ANSI-N509-1980, Table 4 4

OPTIONS

Lifting Eyes

Lifting eyes shall be provided as necessary on top of the housing The lifting eyes shall be constructed of 1/2" diameter rod which will be of the same type of material as the filtration system construction

Weather Cover

Weather covers, which will be of the same type material as the filtration system construction, shall be provided on top of each system. Weather covers shall be intermittently welded and sealed with silicone sealant

Static Pressure Ports

Static pressure ports shall be located on top of the filtration system upstream and down stream of each bank of filter elements

(4)

Static Pressure Ports, Cont'd

Static pressure ports shall be 1/4" NPT coupling with plug Static pressure ports shall be of the same type material as the filtration system construction

DOP/Freon Test Ports

DOP/Freon test ports shall be 3/4" NPT coupling with plug One DOP/Freon test port shall be located on top of the filtration system, upstream of the filter bank, for upstream sampling Two additional DOP/Freon test ports shall be provided for field installation into the duct work One port will be used for DOP/Freon injection and one port will be used for downstream sampling DOP/Freon test ports shall be of the same type material as the filtration system construction

Magnehelic Gauge

Magnehelic gauges shall be located on top of the filtration system and connected to the static pressure ports upstream and downstream of each bank of filter elements For outdoor applications the magnehelic gauges shall be mounted in enclosed panels

Filter Element Changeout Table

A filter element changeout table shall be provided It shall be adjustable and attach to the access door retainers after the door has been removed

Reinforced and Drilled Flanges

The upstream and downstream flanges of the filtration system shall be reinforced to a minimum thickness of 1/4" 7/16' diameter holes shall be drilled in the upstream and downstream flanges of the filtration system with a maximum spacing of 4" center

Minimum Leak Test

The filtration system pressure boundary and filter element sealing surface shall undergo factory testing per ANSI-N510-1980 to 10" w g as specified in table 4 5 of ERDA 76-21, Nuclear Air Cleaning Handbook Construction. all welded man entry steel housing Maximum permissible leak rate (percent housing volume per hour) 0 2%

est Housing

The filtration aerosol test housings shall be Barnebey & Sutcliffe model ATH-I, ATH-C, ATH-O), as manufactured by Barnebey & Sutcliffe Corporation They shall be manufactured from minimum 14 Ga type 304 stainless steel with 2-B mill finish Each housing shall be designed and constructed in accordance with the applicable sections of ANSI-N509-1980 Housings shall be side servicing bank type arrangement All seams and joints shall be welded and free of any sharp edges All welds and welders shall be qualified in accordance with section IX of ANSI/ASME boiler and pressure vessel code Welding procedures and personnel qualification reports shall be submitted to insure compliance with the requirement in accordance with section IX of the ANSI/ASME boiler and pressure vessel code The test housing shall be designed and constructed to allow efficiency testing of each filter element and its supporting framework per ANSI/ASME-N510-1980 While in the test position and at 1,000 CFM per filter element, the resistance across each aerosol test housing shall not exceed 20", in direction of air flow

Certification of Operation

The manufacturer shall provide a certified test report, from an independent testing organization, that the aerosol test housings provide efficiency testing of each filter element and its supporting framework per the intent of ANSI/ASME-NN510-1980

T-1082
B/IE

(2)

oduct Information

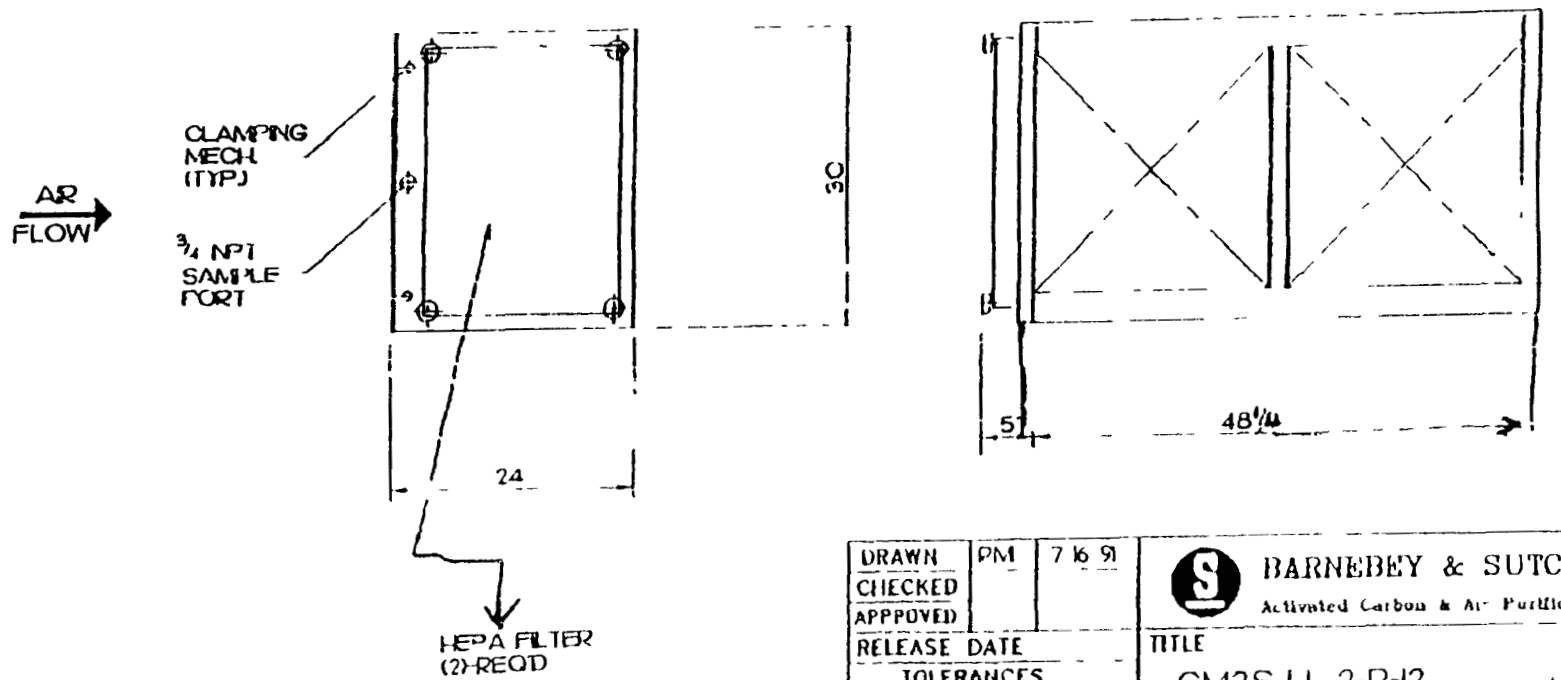
BARNEBEY & SUTCLIFFE CORP
P.O. Box 2520
Columbus OH 43216
Facsimile 614 258-3464
Telephone 614 258-9501

BAG-OUT HOUSING WELDING SPECIFICATION

All "pressure retaining" joints and seams shall be continuously welded "non-pressure retaining" joints such as exterior stiffening may be intermittently welded. As a minimum, all weld joints and seams shall be wire brushed and/or buffed to remove heat discoloration, oxidation all burrs and sharp edges. All welded joints and seams that are a portion of any gasket setting surface, i.e., duct connecting flanges and filter sealing surfaces, shall be ground smooth and flush with adjacent base metals. All weld joints shall be visually inspected for cracks, crater pits, underfill, incomplete fusion, overlaps, surface porosity, gas pockets, crevices and depressions. All welders, welder operators and welding procedures shall be qualified in accordance with ASME BPV Section IX.

T-154
11/10

NOTES 1) MATERIAL- 304 S
2) UNIT WT (INSTALL[illegible] 25 LBS



A	4 91	RM	[illegible]	[illegible]	
REVISION	DATE	DWN	CHK	APPV	DESCRIPTION

ACAD DRAWING PLOT <15 5 10 3> 0 0 (EXPAND) SCALE 1 12

DRAWN	PM	7 16 91
CHECKED		
APPPOVED		
RELEASE DATE		

TOLERANCES	
FRACTION	± 1/8
XX	...
XXX	...
ANGULAR	± 1/2

BARNEBEY & SUTCLIFFE CORP
Activated Carbon & Air Purification Equipment

TITLE
CM3S-H x 2-R-12 BAG-OUT HOUSING

SCALE	SIZE	DRAWING NUMBER	REV
NONE	B		
SHEET 1 of 1			

Page containing possible Proprietary information removed.

...ulate Air (HEPA) Filters

ABSOLUTE

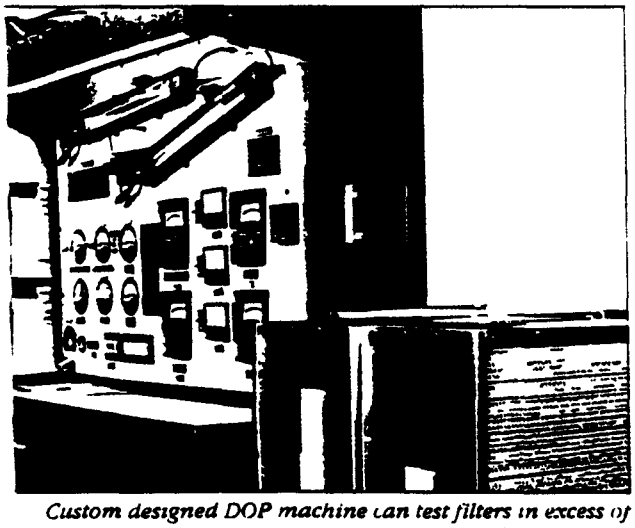
...eets The Highest Degree Of Cleanliness

Farr Absolute filters are the recognized leader in high efficiency, overall reliability and performance

MATERIALS QUALITY CONTROL
Only those materials that meet our stringent quality standards are utilized

SOPHISTICATED ASSEMBLY TECHNIQUES
Critical manufacturing steps are closely monitored to provide the added assurance that every filter will perform as expected

TESTING PROCEDURES
Each filter is individually tested and certified for efficiency and initial resistance by state of the art testing technology use of a penetrometer for 0.3 micron hot DOP test (DOS testing available) or dual laser spectrometer for tests at specific particle sizes In addition, automatic scanning equipment is used to verify leak free filters For more stringent requirements other methods are available Documentation of test data is supplied on individual labels on each filter enclosing frame



Custom designed DOP machine can test filters in excess of 2000 CFM capacity

INSTALLATION
Absolute filters should be the last item downstream of ductwork or as close as possible to the area being served Reasonable care should be taken in installing Absolute filters in order to avoid damage

A manometer or another type of accurate differential pressure gauge should be used on every filter bank Using such an instrument is the only way to be certain that the full life of the filter has been utilized Farr offers a variety of pressure gauges for this purpose

PREFILTERS EXTEND ABSOLUTE FILTER LIFE
Farr Company offers a number of prefilter choices Prefilters can extend the life of the Absolute filter from 45% to 800% The life extension is dependent on a number of factors including the efficiency of the prefilter and the distribution of particulate sizes in the inlet airstream See Farr Bulletin No B-1305 5 for 30/30® filters No B-1306 1 for RIGA FLO® filters No B-1306 8 for Aeropac® filters and No B-1300 24 for Hi Flo® filters

Other High Efficiency Filter Choices

CLEANROOM LAMINAR FLOW
For cleanroom laminar flow installations consider one of Farr's BASICAM PX or CAM 14 PX modules with efficiencies of 99 99% on 0 3 micron to 99 9995% on 0 12 micron These modules fit standard ceiling T mount systems See Bulletin No CR 005 and CR 006

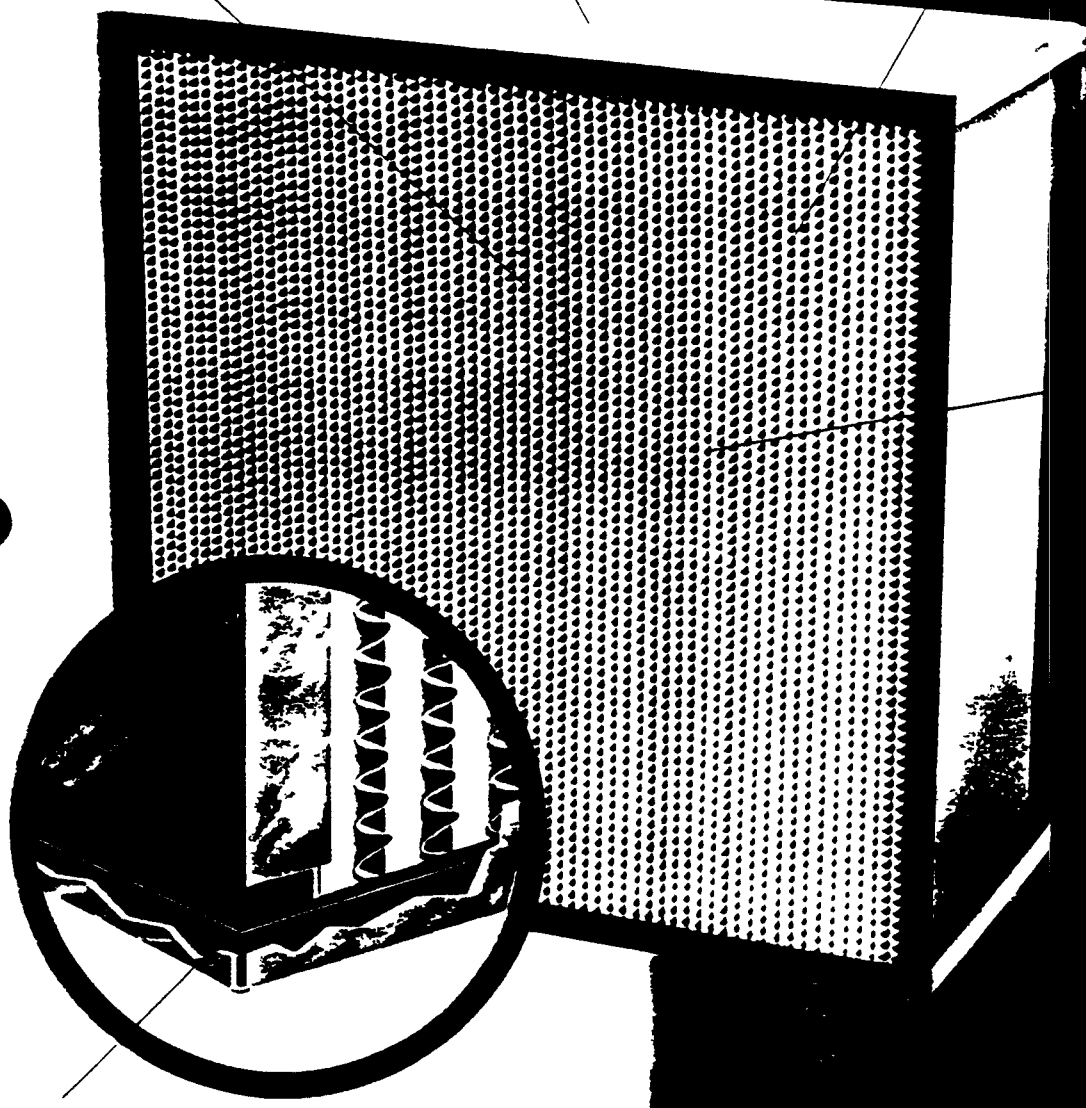
WHEN 95% DOP EFFICIENCY WILL DO THE JOB, SPECIFY THE FARR MICRETAIN®
See Bulletin No B-1304-12

FARR COMPANY also offers a number of other high efficiency filter choices Please contact your Farr representative for more information

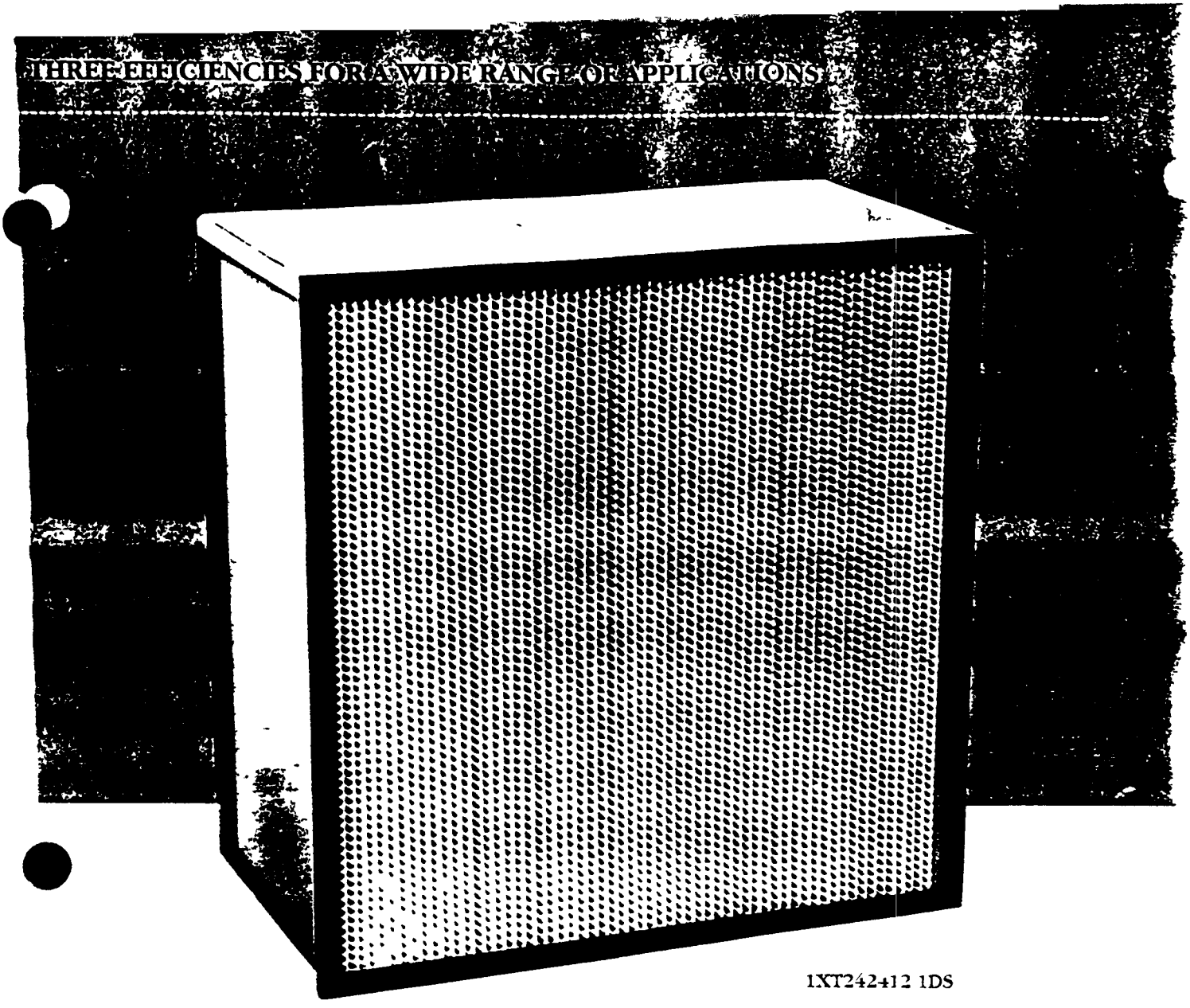
Dual Laser Spectrometer is capable of testing filter efficiency on particles as small as 0 12 microns

WIDE VARIETY OF ENCLOSING FRAMES
The 16 gauge galvanneal (zinc coated steel) enclosing frame provides maximum filter pack protection leak free installation dimensional stability corrosion resistance and the ability to withstand up to 99%+ humidity Enclosing frames made of stainless steel unum, particle board and plywood are also ilable for special applications

FINE-FIBER ALL GLASS MEDIA
The standard Absolute media is water resistant high strength micro fiber glass The media is made to rigid specifications to meet the required efficiency and resistance values



-BODY CONSTRUCTION
irr's unique high stability urethane adhesive ompound and state-of the art potting design ermanently encapsulates the filter pack into ie enclosing frame providing rigid construc on without the need for leak prone mechani- ners (X Body construction shown) Non X Body construction involves the e of rubber base silicone ceramic and other lhesives for special applications



1XT242412 1DS

STANDARD ABSOLUTE 99.97%

Select the Farr Absolute 99 97% when your requirement is for standard applications for High Efficiency Particulate Air (HEPA) Filters The Absolute 99 97% is the industry workhorse It has the broadest application of any of our Absolutes with efficiency guaranteed on 0 3 micron particles Also available in High Capacity design Every filter is efficiency tested at rated airflow in accordance with IES-RP CC 001 Type A, with penetration results recorded on individual labels

SILVER SEAL ABSOLUTE 99.99%

Cleanrooms, clean benches, pharmaceutical processes and other precision areas may demand performance beyond our Absolute 99 97% For applications specify the Farr Silver Seal Absolute which is scan tested to be leak-free in accordance with Fed Std 209D and IES-RP CC 001 Type C The filter utilizes a variety of enclosing frames and construction materials as listed in the Materials of Construction Chart on page 6 The Silver Seal Absolute is also available in the High Capacity design

Silver Seal provides 99 99% efficiency at 0 3 micron Filters are guaranteed to be leak free

GOLD SEAL ABSOLUTE 99 999%

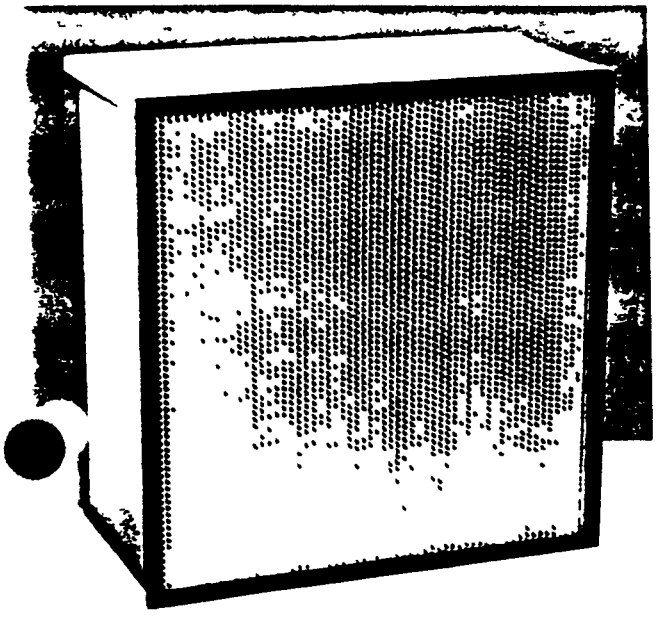
There are a number of areas involved in research microcircuit assembly and other high technologies, where near pertect air filtration is essential The Farr Gold Seal Absolute filter's efficiency of 99 999% on 0 12 micron size particles is individually tested and certified through the use of the Dual Laser Spectrometer Each Farr Gold Seal filter has been scan tested to be leak free in accordance with Fed Std 209D and IES-RP CC 001 Type D The Gold Seal utilizes a variety of enclosing frames and construction materials as listed on the Materials of Construction Chart on page 6

HIGH CAPACITY ABSOLUTE 2000

Engineered for higher face velocity performance

The Farr High Capacity Absolute 2000 uses a tapered aluminum safe edge separator design that provides a number of significant advantages including a higher operating capacity up to 2000 CFM in 24" x 24" x 12" size at 1.26" w.g.

The High Capacity Absolute can be operated at high face velocities (up to 500 fpm) to match high duct velocity applications. Benefits include smaller filter bank requirements and lower overall system cost.

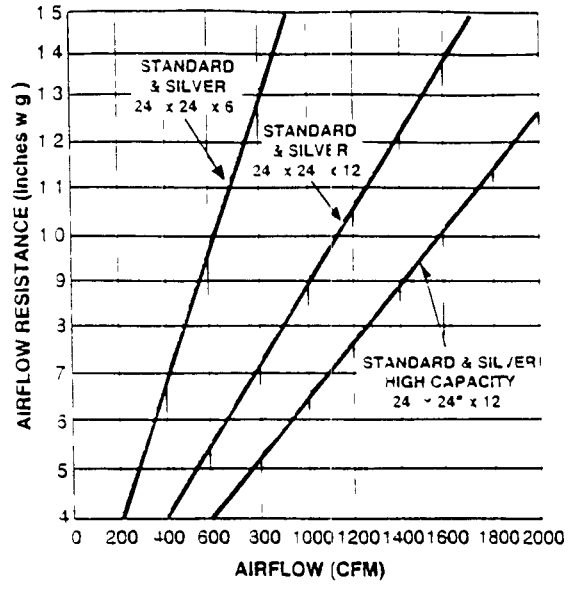


The Absolute 2000 can also be run at lower velocities for longer filter life, greater operating economy and energy savings. The 24" x 24" size filter has an initial pressure drop of only .65" w.g. at the standard velocity of 250 fpm (1000 CFM). Such low pressure drop means longer filter life and less frequent filter changes. This is an important consideration when the filter is used in a remote location or when the particulate matter being filtered is hazardous.

Safe-edge tapered separators in High Capacity Absolutes are an exclusive Farr design. They provide controlled media spacing for virtually no turbulence, uniform dust loading and increased capacity.

A "T" after the series designation indicates the High Capacity design.

ABSOLUTE FILTER PERFORMANCE CHARACTERISTICS



BASICAM PX AND CAM-1® PX LAMINAR FLOW MODULES

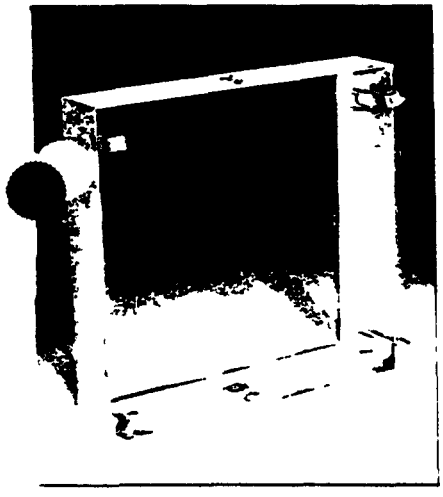
BASICAM PX and CAM 1 PX designs provide a lightweight, low profile (5 3/4") laminar flow alternative to the cleanroom industry with outstanding performance. These modules utilize the Farr ThinLine® separatorless filter pack construction, an all aluminum extruded enclosing frame and are easily mounted in standard T Bar or gel channel ceiling grid systems. Available in a variety of standard and custom sizes with and without airflow damper/diffuser. See Bulletin No. CR.005 and CR.006.

MATERIALS OF CONSTRUCITON/PHYSICAL PROPERTIES

STANDARD SERIES	HIGH CAPACITY SERIES	MEDIA	SEPARATORS	ENCLOSING FRAME	SEALER	GASKET	RESISTANCE TO		
							FIRE	TEMP	HUMIDITY
DY									
Y	YT	Glass	Aluminum	16-gauge Steel	Urethane	Neoprene	Fire Resistant	200°F	Up to 99%+
W	—	Glass	Paper	16-gauge Steel	Urethane	Neoprene	Partial Fire Resistant	200°F	80%
L	LT	Glass	Aluminum	5/4" Non Fire Retardant Particle Board	Urethane	Neoprene	Partial Fire Resistant	200°F	Up to 80%
OTHER SERIES (NON Y BODY)									
D	DT	Glass	Aluminum	Wood	Rubber Base	Neoprene	Partial Fire Resistant	200°F	Up to 80%
H	HT	Glass	Aluminum	Fire Retardant Wood	Rubber Base	Neoprene	Fire Resistant	200°F	Up to 80%
E	ET	Glass	Aluminum	16-gauge Steel	Rubber Base	Neoprene	Fire Resistant	200°F	Up to 99%+
HIGH TEMPERATURE									
F	—	Glass	Aluminum	16-gauge Steel	Ceramic	Glass	Non Flammable	750°F	Up to 99%+
K	KT	Glass	Aluminum	Aluminum	Silicone	Silicone	Fire Resistant	500°F	Up to 99%+

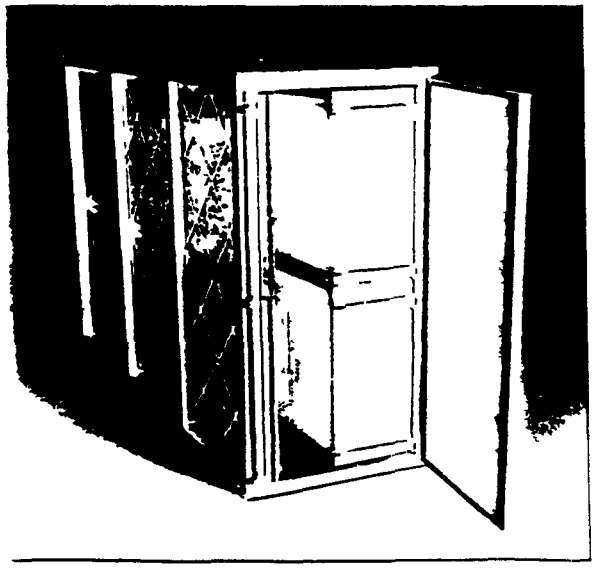
YT E ET H and HT meet the UL 586 and UL 900 Class 2 L LT F K and KT meet UL 900 Class 2 Y Body also available in UL 900 Class 1 Series filters comply with IES RP 1 5

LEAK-FREE HOLDING FRAMES & HOUSINGS



MAGNA-GRID
These factory fabricated filter banks offer simplified installation and filter service One piece factory construction eliminates field erection of individual frames

MAGNA-FRAME
or field or OEM assembly of built up banks in almost any configuration Unequaled in design and service they provide the selection, versatility and integrity to meet any application



For more information on [illegible] frames and [illegible] see our [illegible]na-Series Bulletin No B-1304-6

MAGNA-PACK
For side access applications the Magna Pack will hold a single Absolute filter or up to three high and six wide An optional prefilter track accommodates 2" Farr 30/30® filters

ORDERING INFORMATION

Farr Absolute filters are designated by a four part alphanumeric code number. This number identifies the Absolute with the exact efficiency, physical properties, and gasket number to fill your requirements. Use this four step system to specify or order your Farr Absolute.

STEP 1 — Select the efficiency of the filter you require from the three levels available and enter one of the following identifying code numbers:

1 = 99.97% 12 = 99.99%* 13 = 99.999%**

Example: 12 ___ – _____ – ___

* *Available in X and L series only*

** *Available in X series only*

STEP 2 — For X Body materials of construction insert the letter X. For other series materials of construction, consult the chart on page 6 and choose the series that will fill your requirements. Enter the appropriate reference letter.

Example: 12 X – _____ – ___

STEP 3 — Next, from the standard Model column in the chart below, select the size Absolute for your application.

Example: 12 X – 242412 * – ___

* *For non standard sizes, enter exact dimensions*

STEP 4 — Finally, indicate the number of factory installed gaskets required. If applicable, indicate upstream (US) or downstream (DS) gasket. You have a choice of:

None = 0 One = 1 Two = 2

Example: 12 X – 242412 – 1DS

DS = Downstream US = Upstream

This order number 12 X – 242412 – 1DS designates a Silver Seal Absolute 99.99%, with X Body construction 24" x 24" x 11 1/2" in size and with one downstream neoprene gasket. The identical filter in High Capacity would be ordered by number 12 XT – 242412 – 1DS.

EFFICIENCIES & CAPACITIES — *The chart below shows the dimensions and capacities of the various size X Body filters only. Other series (see Materials of Construction/Physical Properties chart on page 6) typically have 5% lower capacities. For Absolute filters in special sizes or with special materials of construction, contact Farr Company.*

A NOTE ON SEALING METHODS — Farr offers additional sealing techniques that include a knife edge seal and the Cam Gel sealing method.

STANDARD MODELS (1)	DIMENSIONS (inches)			STANDARD 99.97% SILVER SEAL 99.99% AIRFLOW CAPACITY (CFM @ w.g.)			GOLD SEAL 99.999% AIRFLOW CAPACITY (CFM @ w.g.)			SHIPPING WEIGHT (lbs.)
	H	W	D	.65"	1.00"	1.35"	.65"	1.00"	1.35	
X 121212	12.00	12.00	11.50	165	250	340	135	205	–	14
X 122412	12.00	24.00	11.50	350	540	710	290	440	–	25
X 241212	24.00	12.00	11.50	350	540	710	290	440	–	25
X 241812	24.00	18.00	11.50	550	860	1150	450	700	–	30
X 232312	23.38	23.38	11.50	720	1110	1480	590	910	–	40
X 242412	24.00	24.00	11.50	760	1180	1570	620	960	–	40
X 243012	24.00	30.00	11.50	970	1500	2000	790	1220	–	48
X 883	8.00	8.00	3.06	15	25	35	10	15	–	4
X 883	8.00	8.00	5.88	35	50	70	25	40	–	6
X 12126	12.00	12.00	5.88	90	135	185	70	100	–	8
X 24126	24.00	12.00	5.88	190	290	390	150	225	–	12
X 23236	23.38	23.38	5.88	400	600	810	310	470	–	23
X 24246	24.00	24.00	5.88	410	630	850	325	490	–	23
X 24306	24.00	30.00	5.88	530	810	1080	410	630	–	30
X 24486	24.00	48.00	5.88	870	1330	1780	680	1030	–	46
HIGH CAPACITY ABSOLUTE 2000										
XT 121212	12.00	12.00	11.50	210	325	430	165	250	335	16
XT 122412	12.00	24.00	11.50	440	680	900	340	530	710	28
XT 241212	24.00	12.00	11.50	440	680	900	340	530	710	28
XT 241812	24.00	18.00	11.50	700	1090	1460	550	850	1130	34
XT 242312	24.00	23.38	11.50	910	1410	1890	710	1110	1475	46
XT 242412	24.00	24.00	11.50	970	1500	2000	760	1170	1560	46
XT 243012	24.00	30.00	11.50	1230	1900	2540	960	1490	1980	55

1 Non standard sizes may be special ordered.

2 Silver Seal Absolutes available in X and XT series only.

3 Gold Seal Absolutes available in X series only.

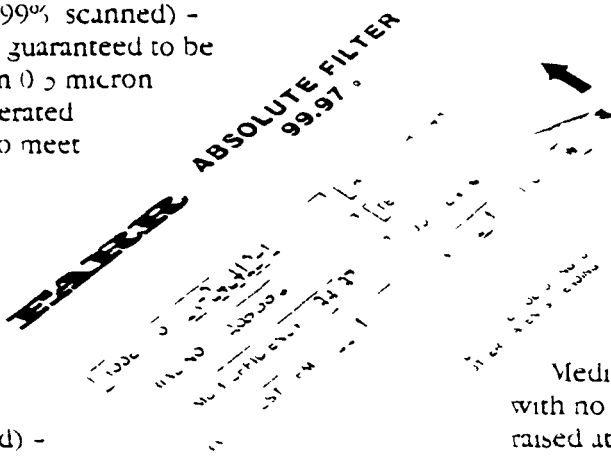
4 Add 10% to shipping weight for Absolute filter with paper separators.

SPECIFICATIONS

Filters shall be Farr model _____ Absolute filters is manufactured by the Farr Company El Segundo lifornia

STANDARD ABSOLUTE (99 97%) - Each filter shall be guaranteed to be 99 97% efficient on 0 3 micron size thermally generated particulates and to meet the leak free scan requirements outlined in IES RP CC 001 Type A

SILVER SEAL (99 99% scanned) - Each filter shall be guaranteed to be 99 99% efficient on 0 3 micron size thermally generated particulates and to meet the leak free scan requirements outlined in Fed Std 209D and IES RP CC 001 Type C

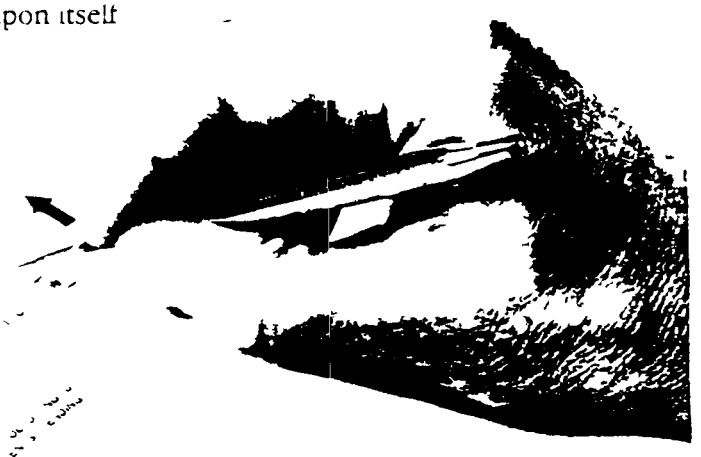


GOLD SEAL (99 999% scanned) - Each filter shall be guaranteed to be 99 999% efficient on 0 12 micron size thermally gener particulates and to meet the k free scan requirements outlined in Fed Std 209D and IES-RP CC 001 Type D when tested to a penetration level of 0 001%

HIGH CAPACITY ABSOLUTE 2000 - These high capacity versions of the standard or Silver Seal Absolute filters shall be tested at 500 fpm to provide 2000 CFM capacity for the 24" x 24" size

Tests shall be run at the 1 0" w g capacity of the filter with the upstream aerosol concentration of 80 ±20 micrograms per liter The test aerosol concentration of a mass median particle size of 0 3 micron with less than 1% by mass under 0 12 or over 0 5 micron The clean filter static pressure drop shall be no greater than _____" w g when operating at an airflow rate of _____ CFM

Filter shall be constructed of all glass water resistant media It shall have a minimum tensile strength of 3 0 pounds per inch of width and shall retain 50% of its tensile strength when folded flat upon itself



Media shall be water resistant to withstand with no water penetration a 20" water column raised at a rate of 12" per minute

Filter shall be factory constructed by pleating a continuous sheet of media into closely spaced pleats with safe edge aluminum (paper vinyl coated aluminum or stainless steel) separators The filter s sealing system shall seal the top and bottom of the filter pack and enclosing frame joints in a completely leak tight manner The adhesive shall be a two-part urethane (rubber base ceramic or silicone) The filter enclosing frame shall be all metal 16-gauge corrosion resistant zinc coated steel (3/4" non fire retardant particle board fire retar dant wood or aluminum) which is capable of maintaining its structurally rigid shape without mechanical fasteners such as bolts screws or rivets

Overall dimensions shall be correct to within 1/8" +0" and squareness shall be within 1 8" Filters shall be supplied with (0) (1) indicate upstream or downstream or (2) closed cell neoprene gaskets

arr Company has a policy of uninterrupted research, development nd product improvement and reserves the right to change design nd specifications without notice.

FARR

Represented by _____

COMPANY Sales Offices and Plants

OX 9218 Los Angeles CA 90009 Telephone (800) 533-7320 FAX (800) 44140003
0 S Main St Crystal Lake IL 60014 Telephone (800) 5260 FAX (800) 44140103
nesboro AR Corcoran CA Delano CA El Segundo CA Rialto CA Crystal Lake IL Holly Springs MS Syracuse NY
nover NC Hazleton PA Antwerp Belgium Montreal and Toronto Canada Birmingham ngland Melbourne

nted in USA 3/94-5642

Printed on Recycled Paper

ATTACHMENT F

ATTACHMENT G

GENERAL CARBON CORPORATION

Activated Carbon

33 Paterson Street
Paterson, New Jersey 07501
Phone (201) 523-2223
Fax (201) 523-1494

COCONUT SHELL

ACTIVATED CARBON

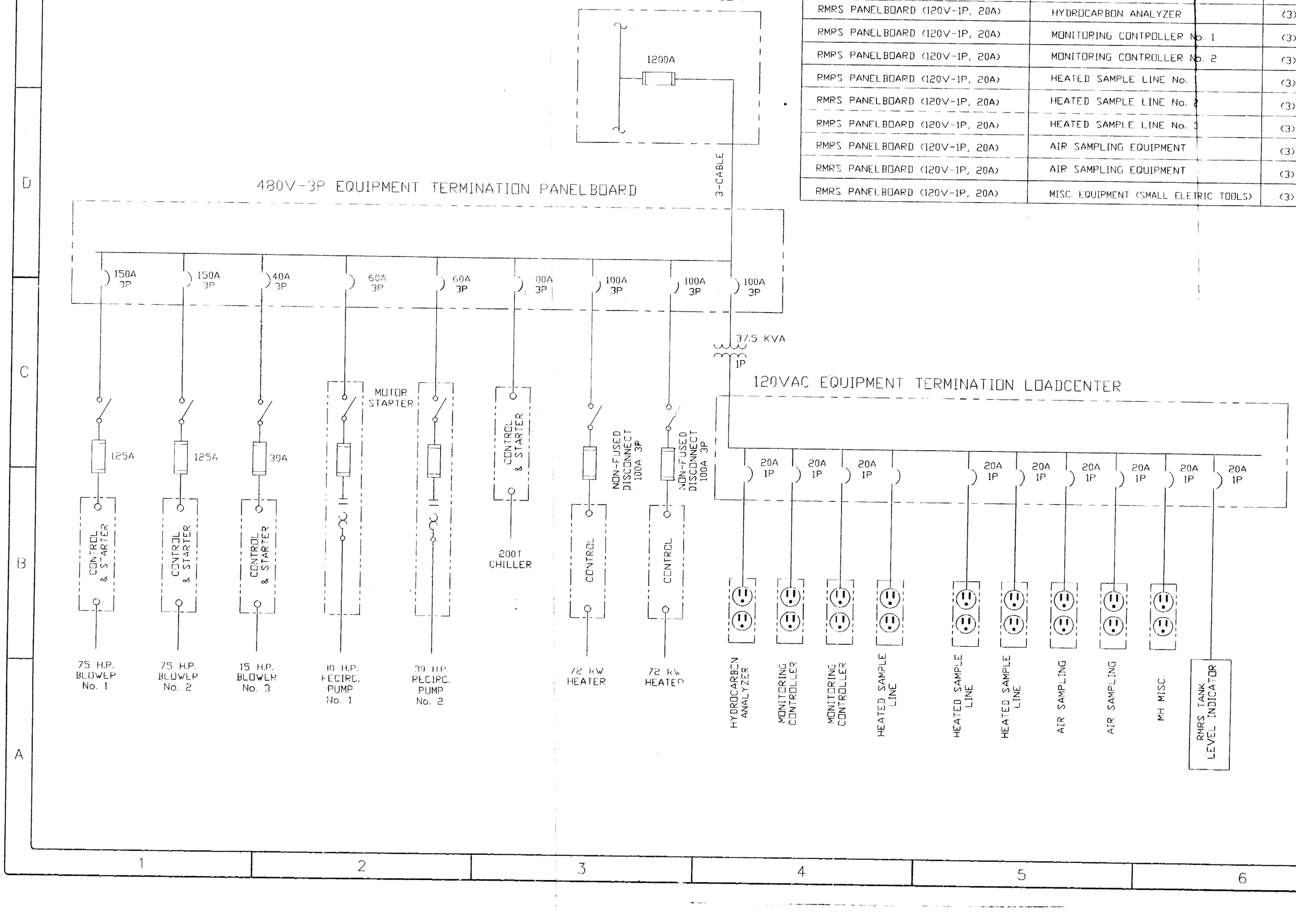
Our 4x6 and 4x8 granular activated carbons are ideal for most air purification purposes. Made from selected grades of coconut shell, their superior level of hardness makes them cleaner than most other carbons and gives them longer life expectancy. This, combined with their high activity level, makes them well suited for use in any kind of carbon filter or system. Aside from general air purification and deodorization, our coconut shell carbons are also very effective in solvent recovery applications. Standard packaging is in 55 lb. bags. Other packaging is available upon request.

Specifications	4x6S	4x8S
U.S. Standard Series Sieve Size:		
4x6	90% min.	---
Less than No. 4	5% max.	---
Greater than No. 6	5% max.	---
4x8	---	90% min.
Less than No. 4	---	5% max.
Greater than No. 8	---	5% max.
Carbon Tetrachloride Adsorption, Weight:	60% min.	60% min.
Iodine Number, mg/gm:	1100 min.	1100 min.
Hardness Number:	98 min.	98 min.
Ash Content:	4% max.	4% max.
Moisture, As Packed:	5% max.	5% max.
Apparent Density, gm/cc:	0.47 min.	0.47 min.

FILE NO. RMS\E-1
DATE 05/6/96
CAD/DP WIA

FEEDER SCHEDULE

FROM EQUIPMENT	TO (TERMINATION)	FEEDER/SIZE/TYPE	DISTRIBUTION DISTANCE
RMRS PANELBOARD (460V-3P, 150A)	BLOWER No. 1	(4) / No.1 / W	200'
RMRS PANELBOARD (460V-3P, 150A)	BLOWER No. 2	(4) / No.1 / W	200'
RMRS PANELBOARD (460V-3P, 40A)	BLOWER No. 3	(4) / No.1 / W	200'
RMRS PANELBOARD (460V-3P, 60A)	RECIRCULATION PUMP No. 1	(4) / No.6 / W	200'
RMRS PANELBOARD (460V-3P, 60A)	RECIRCULATION PUMP No. 2	(4) / No.6 / W	200'
RMRS PANELBOARD (460V-3P, 700A)	CHILLER 300T	(2 EA)(4) / 350MCM / W	200'
RMRS PANELBOARD (460V-3P, 100A)	HEATER No. 1	(4) / No.1 / W	200'
RMRS PANELBOARD (460V-3P, 100A)	HEATER No. 2	(4) / No.1 / W	200'
RMRS PANELBOARD (120V-1P, 20A)	HYDROCARBON ANALYZER	(3) / No.8 / W	300'
RMRS PANELBOARD (120V-1P, 20A)	MONITORING CONTROLLER No. 1	(3) / No.8 / W	300'
RMRS PANELBOARD (120V-1P, 20A)	MONITORING CONTROLLER No. 2	(3) / No.8 / W	300'
RMRS PANELBOARD (120V-1P, 20A)	HEATED SAMPLE LINE No. 1	(3) / No.8 / W	300'
RMRS PANELBOARD (120V-1P, 20A)	HEATED SAMPLE LINE No. 2	(3) / No.8 / W	300'
RMRS PANELBOARD (120V-1P, 20A)	HEATED SAMPLE LINE No. 3	(3) / No.8 / W	300'
RMRS PANELBOARD (120V-1P, 20A)	AIR SAMPLING EQUIPMENT	(3) / No.8 / W	300'
RMRS PANELBOARD (120V-1P, 20A)	AIR SAMPLING EQUIPMENT	(3) / No.8 / W	300'
RMRS PANELBOARD (120V-1P, 20A)	MISC. EQUIPMENT (SMALL ELETRIC TOOLS)	(3) / No.8 / W	300'



REV#	DATE	DESCRIPTION	APP'D
X	X/XX/XX	XXX	XXX

McLAREN HART ENVIRONMENT.
CHARLOTTE, N.C.

PROJECT TITLE
MOUND SITE LTTD

XXXX XXXXX
P.E
DATE

McLaren Hart ENVIRONMENTAL ENGINEERING CORPORATION
9323 STOCKPORT PLACE
CHARLOTTE, NC 28273

DRAWING TITLE
ELECTRICAL
ONE-LINE DIAGRAM

DATE: 03/19/97	DRWN: ENSER/JEM	DWG NO. E-1	REVISION
SCALE: NONE	CHK'D: XXX		
PROJECT # CHAPLOTTE	APP'D:	SHEET 1 OF 1	